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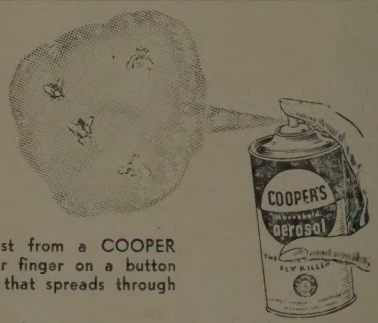

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Minister of Agriculture

This Month's Cover

Bulk harvesting of apples in the upper Moutere district, Nelson Province, is the subject of this month's cover from a colour photograph by R. V. Francis Smith. In use is a fork-lift harvester, one of the several variations of bulk handling equipment designed by orchardists themselves for the harvesting of apples and pears. Bulk handling speeds up harvesting and eliminates the lengthy and costly carting of fruit cases to and from the orchard, the unloading and stacking, and the tipping of fruit into the hoppers of the grading machine. All this handling caused bruising of the fruit, which with the bulk method is surprisingly less.

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ROYAL VISIT

DUKE OF EDINBURGH'S INTEREST IN PRIMARY PRODUCTION

HIS Royal Highness the Duke of Edinburgh was emphatic in his speech at a State luncheon in Wellington during his four days in New Zealand in December that he was in the country to see what he himself wanted to see. Two afternoons of the four days were occupied with visiting and seeing closely activities connected with primary production. During his inspection of a meat works, a freezing company handling dairy produce, a refrigerated ship loaded with chilled and frozen meat and dairy produce for export to Britain, a town-supply dairy farm, and an agricultural aviation demonstration the Duke's lively interest in all he saw and his readiness to talk to and question those he met in factory or on farm confirmed his statement that he wanted to see where the food came from; to see the timber industry, production from New Zealand's forests, and development of the reservoirs of power and of farm production. These things, said the Duke, were the basis of the economy of New Zealand and the main source of her prosperity. They were important to New Zealand and to the United Kingdom, as the economies of the two countries were closely linked.

A FEW weeks before the Duke's visit the leader of the United Kingdom delegation to the Seventh International Grassland Congress in this country, Dr. William Davies, Director of the Grassland Research Institute, Hurley, England, had reminded those attending the annual conference of the New Zealand Grassland Association at Canterbury Agricultural College, Lincoln, of the stricture on British agriculture delivered

Heading photograph: Pride of place in the line-up of types of aircraft engaged in aerial agriculture inspected by the Duke was given to the Tiger Moth. The machine shown has done 7 years' top-dressing work. These light aircraft comprised almost the entire fleet during the phenomenal rise of the aerial agricultural industry and have been responsible for 90 per cent. of the work done to date. They still comprise half the fleet at present in operation. On the Duke's right are Mr. F. P. H. Rowley, chairman of the Canterbury-Marlborough branch of the Aviation Industry Association, and Mr. G. M. Robertson, vice-president of the Aviation Industry Association.

by Professor M. McG. Cooper, a New Zealander who is Dean of Agriculture at the University of Durham, England, that the land in Britain was being "farmed at half-cock". Dr. Davies added to Professor Cooper's remark his own opinion that "grassland production all over the world is nowhere near potential. A few of the very best pastures might be good and near potential, but the average pasture, whether in temperate or tropical regions, is even today being farmed at what 'Mac' Cooper has called half-cock, and may well be no better than quarter-cock".

Farming, and the utilisation of the products of farming, at full-cock must have been the impression the Duke gained from what he saw here. Management of the dairy farm he visited was based on maximum use of grass growth by grazing animals, spread of pasture production by the use of irrigation, the electric fence, and close subdivision, and conservation of surplus pasture by the making of hay and silage. This was on flat river silt country. That improvement of hill country is at least being attempted at full-cock, and might even be rated a full-scale offensive, was shown by the Aviation Industry Association's display of aerial agriculture at the foot of the Port Hills near Christchurch.

Meat Works Visit

The meat works of the Gear Meat Co. Ltd., Petone, is on the north-eastern foreshore of Wellington Harbour, a stone's throw from the beach on which the New Zealand Company's first settlers landed from the United Kingdom in 1840. Today the works is one of 6 meat export works whose production is shipped from the port of Wellington and one of the 32 in the Dominion slaughtering livestock for the export meat trade.

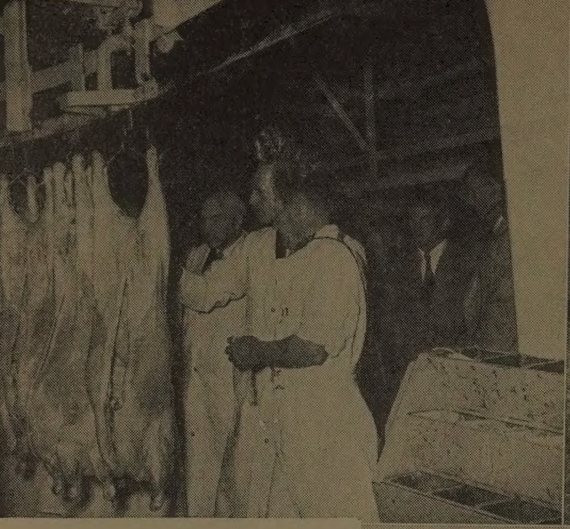
Livestock slaughtered at works using the port of Wellington in 1955-56 totalled 3,225,000, comprising 149,000 cattle, 127,000 calves, 823,000 sheep, 2,100,000 lambs, and 26,000 pigs.

Complete utilisation of the animal carcass that has gradually become possible through the introduction of refrigeration in 1882 and subsequent improvements in processes at meat works was the theme of the operations of the Gear Company's works shown to the Duke. His tour started with the live penned animals awaiting slaughter and ended with by-products such as meals and fertilisers, casings, and processed pelts.

"Some people may not think going to a meat works is pleasure", the Duke had told his audience at the State luncheon before his Petone visit; "but I am interested in going to a meat works and what interests me is pleasure and that is fun". In a white coat and goloshes with his trouser cuffs turned up the Duke was obviously keenly interested in everything he was shown and immediately, by his readiness to stop and discuss with the nearest worker the job he was doing, established the friendly and informal atmosphere that characterised his tour.

Aspects of the operation of the works in which the Duke seemed particularly interested were the "learners' chain" that prepared workers for engagement on the main killing chain, the speed and efficiency

Shed routine in the machine milking of a town supply herd is explained to the Duke by Mr. C. J. McFadden, Belfast, and his son Graham. The 5-cow plant and two men milk an average round-the-year herd of over 80 cows in 1½ hours. The herd is milked morning and evening at 12-hour intervals. All cows are T.B. tested and inoculated against contagious abortion.



ROYAL VISIT

Upper left—The Duke of Edinburgh, having followed the processes in the slaughtering of stock at the Gear Meat Company's works, discusses points in the inspection and grading of carcasses coming off the killing "chain".

Upper right—The Duke meets the pilot of a British machine at the agricultural aviation display at Cashmere.

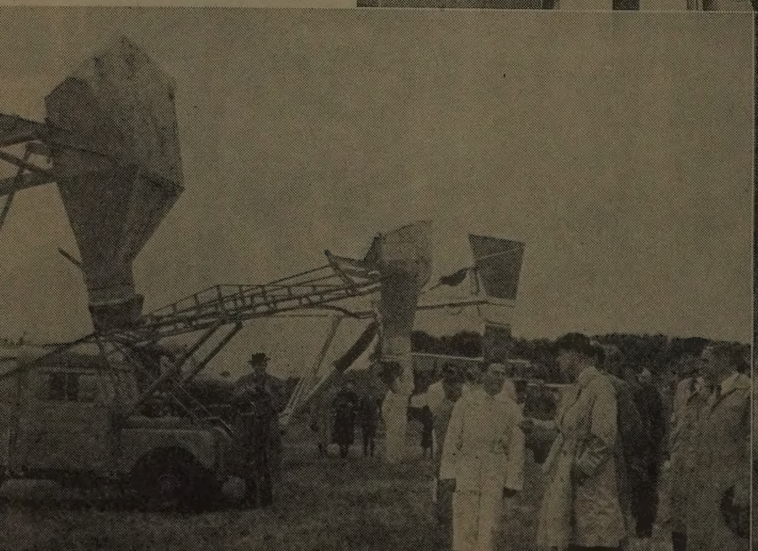
Centre—The Duke tastes a sample of butter at a Wellington cool store and discusses quality of dairy produce with the grader in charge, Mr. M. R. Tennet.

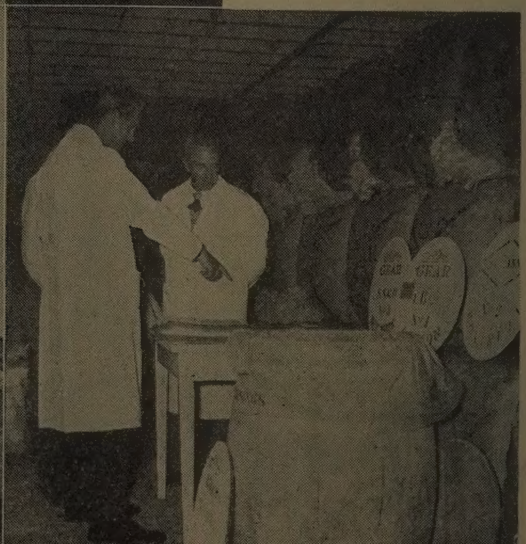
Centre background — Irrigation works being inspected on a town supply dairy farm at Belfast.

ROYAL VISIT

Lower left—Inspection of fertiliser and spray loading equipment developed by agricultural aviation operators and engineers. Quick and efficient loading of aircraft on farm airstrips has been a major factor in the rapid increase in aerial topdressing, seeding, supply dropping, rabbit poisoning, and spraying.

Lower right—Complete utilisation of the slaughtered animal was demonstrated on the Duke's tour of a Wellington meat works and the Duke spent some time examining the processing and use of offals and by-products.





of which impressed him; the system of tagging carcasses as they moved on the chain to identify ownership of different lots; the inspection and grading of carcasses; and the pre-cutting and pre-packaging of meat broken down into retail cuts.

Dairy Produce Cool Store

In the cool store of the Co-operative Dairy Producers' Freezing Co. Ltd. on the Wellington waterfront the Duke saw the reception for storage and grading of butter, cheese, and milk powder manufactured in the Wellington Province by the 17 butter factories and 26 cheese factories whose production is exported from the port of Wellington. Butter and cheese graded for export at the stores in the 1955-56 season totalled: Butter, for export, 11,400 tons; for local consumption, 3900 tons; cheese, 11,200 tons; whey butter, 400 tons.

The Duke inspected the grading and chemical analysis of dairy produce and inquired closely into the maintenance of standards of quality.

Two small loaf cheese manufactured at the Dalefield Co-operative Dairy Factory and a small box of butter made by the Cheltenham Co-operative Dairy Company were presented to the Duke.

A Canterbury Dairy Farm

High production in one of the lower rainfall areas (26in. per annum) was exemplified in the farm of Mr. C. J. McFadden, Belfast, Canterbury, which was visited by the Duke. The property, of about 180 acres, is well sheltered and closely subdivided to enable maximum use of pastures by the herd of grade Friesians producing 70,000 gallons of milk a year for town supply. Ninety cows are milked in winter and 73 in summer. The farm is on flat river silt country and irrigation water from the neighbouring Waimakariri River is used by both the border dike and spray methods.

After the Duke had inspected the standard internal race milking shed with its electrically operated 5-cow milking machines and chilling unit for holding of milk he toured the farm and saw the pumping equipment for raising irrigation water from the main river diversion race to the farm race and the storage lake on the farm. The herd was inspected in one of the many small paddocks that, with the central access road considered essential for the effective operation of a dairy unit, enable maximum utilisation of pasture and an even spread of fertility round the farm.

Mr. McFadden discussed with the Duke the general farm management. Grazing of the ryegrass-white clover-timothy pastures is controlled with the electric fence and the Duke saw the stacking of baled hay made from saved pasture.

DUKE SEES AGRICULTURAL AVIATION

The Duke discusses farm management with Mr. McFadden on a typical well-sheltered irrigated pasture.

After inspection of the irrigation system the Duke returned to the milking shed where the herd had been driven in for the afternoon milking. The quiet, efficient handling of the cows in the bails by the non-stripping method that enables the milking of the national herd of 2 million dairy cows by a surprisingly small labour force was well illustrated and the Duke showed keen interest in shed routine and the provision for hygienic operation of the machines.

Agricultural Aviation

That the Duke was aware of the greatly expanded use of aircraft in New Zealand for agricultural work was evident in his inquiry of the Prime Minister, Mr. S. G. Holland, on his arrival about the agricultural aviation demonstration arranged in Palmerston North to coincide with the Seventh International Grassland Congress in November. A special display for the Duke was arranged by the same sponsors, the Aviation Industry Association of New Zealand, an organisation representing nearly all the farm work companies.

Appropriately the demonstration of aerial methods of land improvement that have achieved astonishing results on hill country in the past few years was arranged on part of the original Cashmere estate, near Christchurch, founded by Sir John Cracroft Wilson, who with his large-scale drainage work on 1000 acres of hitherto despised swamp that he took over in 1859 could claim a place among the first notable land improvers in the country.

A strong wind on the afternoon of the display necessitated the shifting of the demonstration from the Cracroft Wilson estate to a neighbouring airstrip on the property of Mr. E. G. Robertson, where most of the types of fixed-wing aircraft used in agricultural work and mechanical loading equipment were drawn up with owners and operators beside them for the Duke's inspection.

The Duke's interest in commercial aviation was emphasised by his urging the need for a strong, modern, and efficient mercantile air service on leaders of the British aircraft industry in his address in 1954 to the Royal Aeronautical Society. As he passed along the line of aircraft and discussed with each pilot the special features of his machine he seemed particularly interested in the two British machines designed especially for agricultural work. The other aircraft demonstrated were two adapted British machines and four American planes designed for the work.

For about half an hour the small paddock airstrip and a nearby hillside were the scene of continuous take-offs, fertiliser dropping and spraying, and landings in a concentrated and striking demonstration of the capabilities of the machines and their pilots.

The Duke with a small official party in the centre of the paddock was an obviously appreciative spectator and only a flurry of heavy rain drove him from the airstrip.

Rain threatened during much of the Duke's agricultural engagements; it stopped the loading of the Ruahine with export produce that the Duke was to have seen at a Wellington wharf and curtailed the aerial agricultural show near Christchurch. Those who appreciate its value in the pastoral production of this country call it well distributed. Sir Bruce Levy described it to Grassland Congress visitors as "the life-stream of the turf". One feels sure that the Duke would be prepared to accept its falling during his visit as necessary for his full appreciation of the agricultural scene.—*G.J.N.*

A Method of Silage Stacking

By B. A. J. SMITH,
Fields Instructor, Department of Agriculture, Palmerston North

RECENT surveys have shown that wastage on the sides of silage stacks varies considerably with the different shapes of stacks. In a trench the depth of wastage on the sides is as little as 2in., but in a normal stack the depth may be as great as 11½in. to 12in. On many farms topography does not allow the use of trenches, so stacks must be used. The greater depth of wastage on stack sides is due largely to the lack of consolidation on the edges. If trampling can be done to the edge, the amount of waste is appreciably reduced, and this article describes a method of stacking which will achieve this.

A FARMER in the Makerua (Manawatu) district has overcome his wastage problem very successfully and at the same time made his method of stacking easier. Since his tractor is equipped with a fore-end loader, he prefers to build stacks rather than wedges.

The stack is consolidated right to the edge, with no fear of the edge falling away, and wastage at the sides is appreciably reduced.

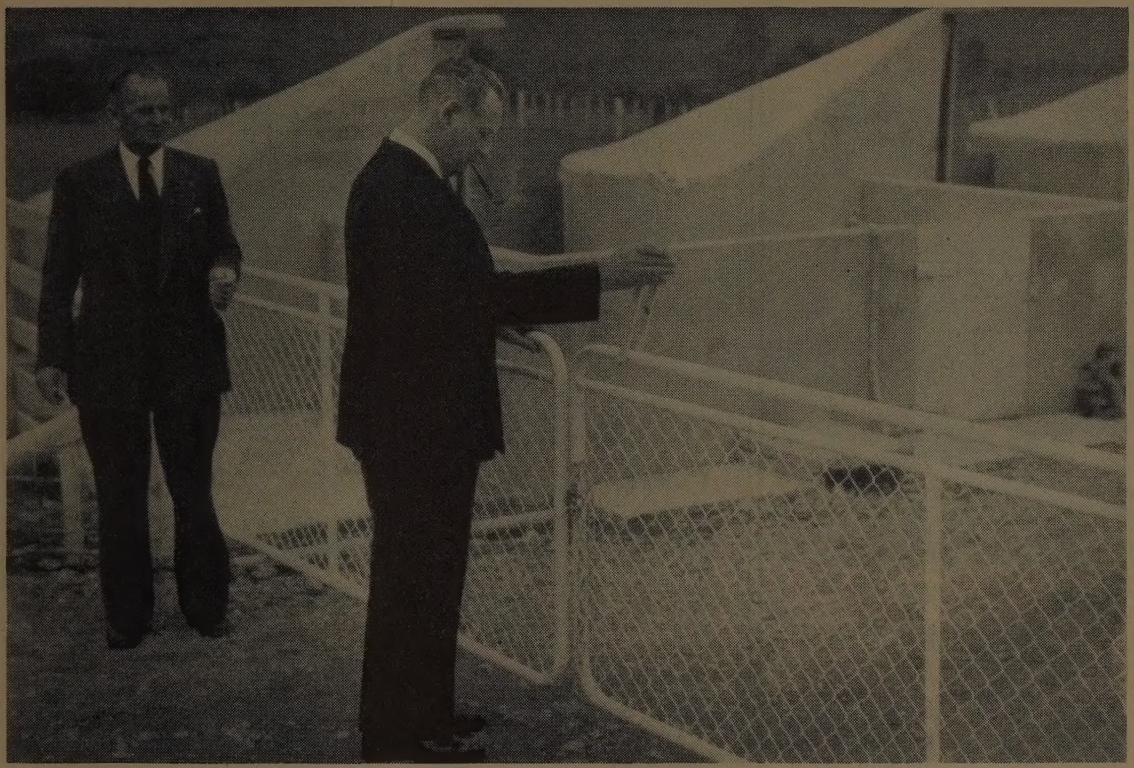
The fence has been raised for the first time and filling continues.

Before the stack is begun a circular fence is erected enclosing the stack site. Generally the fence encloses an area with a diameter of 18ft. The fence is built of ordinary pig netting erected around eight or nine iron standards spaced regularly. The standards are placed inside the netting, but not attached to it.

Sawn wooden fencing battens are then nailed at 6in. intervals, also around the **inside** of the netting.

Green material is then placed inside the fenced area with the fore-end loader, spread out, and tramped well around the edges. When the level of green material reaches the top of the fence the whole fence is raised about 2ft. and the filling process continues. Lifting the fence is fairly easy, as the battens hold the netting away from the stacked grass, and the whole fence is guided up by the iron standards. If there is any difficulty in raising it, the fore-end loader assists.

By this method the material can be trampled right to the edge and good consolidation is obtained. Stacking is easier and not so much care is needed to maintain straight sides. Wastage has been reduced to 3in., most of which is due probably to the effect of air on the outside material.



Pig Producers' Council Breeding Centre

By A. LONGWILL,
Superintendent, Pig Industry, Department of Agriculture, Wellington

WHAT must be regarded as something of a red letter day for the pig industry was celebrated at Korakonui Road, Te Awamutu, on 27 November, when the Minister of Agriculture, Mr. K. J. Holyoake, officially opened the new Pig Breeding Centre established there by the New Zealand Pig Producers' Council. This event marks an important stage in the fruition of the council's plans for pig improvement which, in turn, are fundamental to the development of a sound pig industry.

AS long ago as 1928 a long-term study of crossbreeding in pigs began at the Minnesota Experiment Station, U.S.A. This study gave scientific support to the animal husbandry man's preference for a crossbred animal as the basis of production where growth and meat qualities are the prime consideration.

For pigs they did more than this, showing that the first cross or hybrid sow was generally a better mother than the purebred and reared larger litters and heavier pigs. In these studies there was evidence, based on a large number of litters, that for numbers reared and feed conversion efficiency, the most profitable system of breeding was out-crossing. This is the mating of a first-cross sow to a purebred boar of a third breed.

Practical Application of Hybrid Vigour

In 1952 the author, in a paper read to the New Zealand Society of Animal Production, referred to these findings, as well as other fundamental work, in advocating a national pig improvement plan based on the use of a first-cross sow produced from tested parents on some agreed plan, details of which would be decided on the basis of results of experiments with breeds used in New Zealand. To provide stock worthy of the good pig husbandman, it was postulated, the pig improvement work should be an integral part of the extension service to producers.

Considerable discussion took place over the ensuing year among scientists interested in the problem. Owing to high losses in purebred Berkshire pigs at Ruakura, crossbreeding with the Large White had been introduced purely as a means of producing pigs suitable for feeding experiments. This was now carried a stage further and some first-cross gilts were selected for breeding. When litter results from these gilts back-crossed to the Large White boar were available, showing that the first-cross gilts reared 9.6 pigs per litter as against 6.7 for Berkshire and 7.5 for Large White parent strains, the interest of industry leaders in this approach to improvement of pig production efficiency was aroused.

The New Zealand Pig Producers' Council and the New Zealand Pig Breeders' Association both approved a report on pig improvement policy put forward from the Waikato District Pig

HEADING PHOTOGRAPH: The Minister of Agriculture, Mr. Holyoake, opens the gates of the main drive into the New Zealand Pig Producers' Council Breeding Centre at Korakonui Road, Te Awamutu. At his left is Mr. D. J. Carter, Chairman of the Council.

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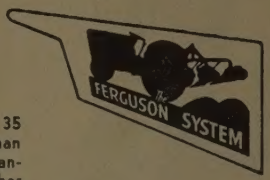

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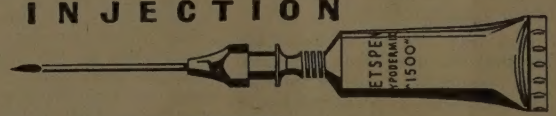

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At the opening ceremony in front of the office; the general layout of the centre can be seen. The main race has the farrowing units to the left and gilt and boar houses on the right.

Council. The first-mentioned body agreed to assist in the establishment of a breeding centre at Ruakura at which the experimental and early testing work on the production of Large White x Berkshire hybrid sows could be undertaken.

This breeding centre was established in 1953 and the basis of the scheme as then envisaged was described in the article "Breeding Pigs with Better Performance" in the May 1953 issue of the "Journal". The scheme has been administered by the Pig Producers' Council with the advice of a joint committee and may be regarded as a good example of Government-industry enterprise.

Hybrid Sows Tested at Massey College

As the scheme has developed, adjustments have had to be made to the original plans. Advantage was taken of the opportunity afforded by Massey Agricultural College to co-operate in the scheme. Financial assistance provided by the Pig Producers' Council enabled the College to remodel its whole pig husbandry department and to undertake the testing of the hybrid sows bred in the original breeding centre at Ruakura.

Some 83 sows were tested at Massey before a decision was made as to their suitability for release to farmers. Of these 19 have for various reasons failed to meet all requirements and have had to be culled; the remaining 64 have been distributed to farmers. Already, despite the inevitable proportion of failures, reports of outstanding performances from some of these sows where they are well managed have confirmed expectations of superior productive capacity.

Development of New Breeding Centre

Though the original agreement between the Pig Producers' Council and the Department of Agriculture provided for the breeding work to be carried on at Ruakura for 5 years, the council realised that this time would soon slip past and in 1954 it began to look about for possible sites for its own breeding centre. It was fortunate to be able to arrange for a site so conveniently situated to the main pig-producing districts as that at Korakonui Road, Te Awamutu. By arrangement with the Justice Department an area of about 70 acres on the edge of the National Prison Centre Farm and fronting Korakonui Road was taken over. Development of the centre began with surveying and pegging of the central access road on 25 June 1955.

The layout of the centre was planned as a whole and separate contracts let for various units. In this way, and with the stationing of the council's own staff at the centre as soon as housing was available for them, the whole development has proceeded quickly.

At the opening date the buildings completed and in use on the station were:—

(a) Residential and administrative: 3 staff houses, office, 2 garages.

(b) Piggery: 55 round farrowing houses with control yards; 24 units of junior gilt houses with 12 units for boars; 15 units of dry sow houses; 70-unit (double range) progeny-test house; boiler house for cooking swill; meal house; implement shed; tanks and pump house.

Feed supply is skimmed milk from 600 dairy cows. This will be supplemented by other supplies of milk, swill, slaughterhouse offal, and purchased concentrates.

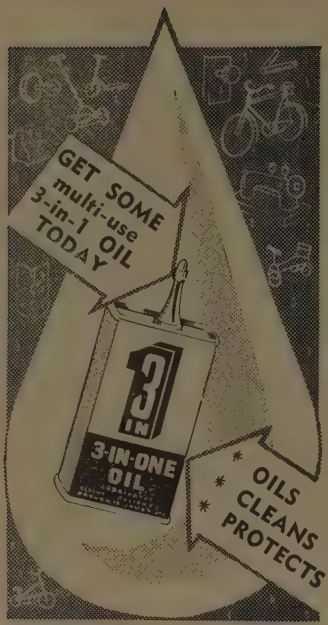
Cost

The total cost of development of the breeding centre will exceed £60,000. Is this large expenditure on one station warranted? The council is not regarding this enterprise on any short-term, profit-earning basis, but is confident that the investment will pay dividends through improved standards of efficiency in the industry to which the proven stock will contribute their share. Producers' money is being handled prudently and an asset has been created which will almost certainly increase in value.

The Role of the Breeding Centre

The role of the centre will be seen more clearly if the immediate function and possible future developments of the centre are considered. In the immediate future the main function will be the production of hybrid Large White x Berkshire gilts for distribution through district pig council supervisors to farmers at a fixed price, depending on age of the gilt when taken over by the farmer and the time of year when she is transferred. These National Hybrids will be bred from Large White sows and Berkshire boars from litters tested at Ruakura and passing the following **minimum** performance standards:—

1. **Litter production of dam:** 7 pigs reared with a total litter weight of 75lb. at 21 days in maiden litter or 8 and 95lb. in subsequent litters.
2. **Efficient conversion of food** to meat of litter mates: Not more than 2.75 food units per pound live-



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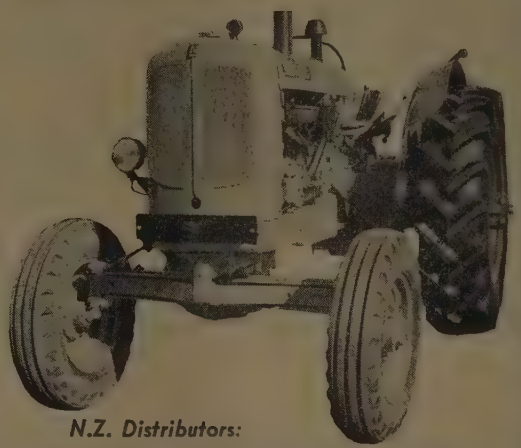

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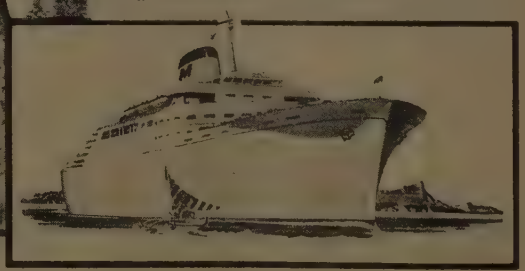

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▲ Northern aspect of the progeny-testing house with its three wings each capable of housing 200 pigs from weaning to porker weights. Each wing abuts on to a wing running east and west which houses a further 100 pigs up to baconer weights. The meal house and implement shed show behind the progeny-testing house.

weight gain between 40lb. and 100lb. liveweight.

3. **Carcass quality** of sample litter mates slaughtered and submitted to carcass appraisal: 70 per cent. of possible carcass points.

The hybrid gilts themselves cannot any longer be farrowed for a test maiden litter before going out to farmers, but the results given by the hybrid sows to date indicate that their chances of performing better than their dams are very good. The replacement policy of the council in cases of failure for which the farmer's own management cannot be held responsible is in line with established breeders' practice and this should smooth out the difficulties which undoubtedly will arise occasionally.

The results of 52 farrowings at the breeding centre, including 24 litters which were still on the mothers but past the 3 weeks' stage at the opening day (all Large White sows in pig to Berkshire boar) were as follows:—

LITTER NUMBERS BORN AND REARED

Age of sow	No. of litters	Born	Reared	Loss per cent
3rd litter or older	9	13.2	11.0	16.7
2nd litter ..	6	13.1	11.6	11.4
Gilts	37	11.05	9.5	14.0

The over-all losses to weaning at present average 13.4 per cent. The causes of these losses, with national survey figures in parentheses, expressed as percentage of total pigs born in each case, are: Born dead 4.4 (9.9), overlain 2.1 (7.0), destroyed and died after birth 6.9 (8.3).

In addition to the production of National Hybrid sows the centre will soon take over from Ruakura the nucleus pedigree national herd of Large Whites. The standards of performance used in the selection of breeding animals in the stud will be maintained and possibly raised as time goes on. Proven stock from this nucleus will be available for sale to private studs where performance recording is being done. Others, surplus to the requirements of maintaining the stud, will be used in cross-breeding for the production of the future generations of hybrid sows

Future Developments

With a potential output of a little over 1000 pigs per year, half of which would be barrows sold for pork or bacon, the influence of the centre in supplying the markets for commercial sows would be very limited. The centre will, however, provide a necessary further stage in the main scheme by initiating the multiplying phase of the scheme. The logical developments are twofold:—

(a) Continued progeny testing of purebred parent stock and progressive extension of facilities for progeny testing, under testing station conditions, of pedigree breeders' stock.

(b) The establishment of a chain of multiplying units throughout the country which would be kept supplied with tested parent stock from the breeding centre or other testing breeders.

The first of these developments is fundamental to any long-term pig improvement and will demand the setting up of testing station facilities as soon as is practicable. A scheme of on-farm performance recording of pedigree breeders' stock was launched in June 1956, as described in the July 1956 issue of the "Journal". This scheme will enable breeders to identify their best breeding animals, but will have the weakness from the point of view of national pig improvement that comparisons between performances of pigs on different farms and under different conditions of management would not be valid.

A testing station where controlled progeny tests can be carried out is therefore necessary. As such a station will be costly to build and run, some preliminary sorting of the pedigree stock of the country is desirable to ensure that those with a reasonable chance of succeeding are first given pen room in the testing station.

The Pig Producers' Council has indicated to breeders that it is prepared to work with them toward

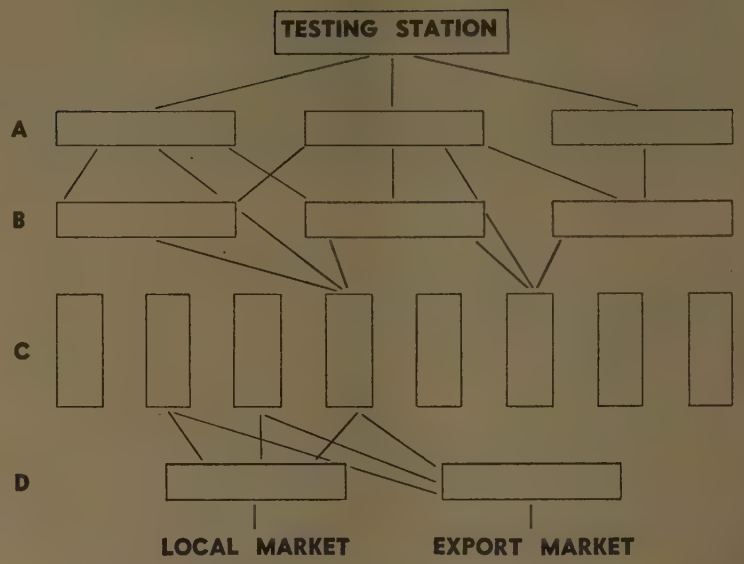
▼ Mr. W. G. T. Hope, who is in charge of the centre, conducts the Ministerial party round the buildings. This view is from the centre of the layout looking south toward the Korakonui Road entrance.

the establishment of testing facilities for their stock, and the Pig Breeders' Association will doubtless follow up the offer with all the energy at its command.

Multiplying Units

Roughly 30,000 sows are required annually as herd replacements in New Zealand. If the National Hybrid Sow Scheme is to have a wide influence, the majority of these sows should eventually be hybrids and an extensive chain of approved multiplying units will be needed.

Massey College is to be the first outstation multiplying unit and is now stocking up with breeding stock from strains which have performed well at Ruakura. Litters from which hybrid sows are selected must have performed at least up to the minimum standards set out on pages 121 and 123. The breeding stock used for production of the hybrid sows must, as soon as possible, be all proven breeding animals. For this purpose the proving of boars for use in multiplying units as well as for stud purposes must have high priority at the breeding centre, as establishment of multiplying units could well be limited by the supply of proven sires.



A—Purebred testing breeders (including National stud).
B—Multipliers of hybrid stock from tested parents (including National Breeding Centre).
C—Private commercial producers of porkers or baconers.
D—Trader in pig meats.

Chart showing the scheme for distribution of tested breeding stock to commercial producers.

Structure of Pig Breeding in N.Z.

The chart above shows how the writer envisages the breeding scheme will work. It emphasises that there is ample scope within the scheme for the private pedigree breeder and multiplier. The main practical limitations are that the co-operating pedigree breeder must record all his litters on the farm and make use of testing station facilities when they become available and the multiplier must ensure that litter recording, at least to the 3 weeks' stage, is carried out for all litters. In both cases feeding systems should be standardised as far as practicable.

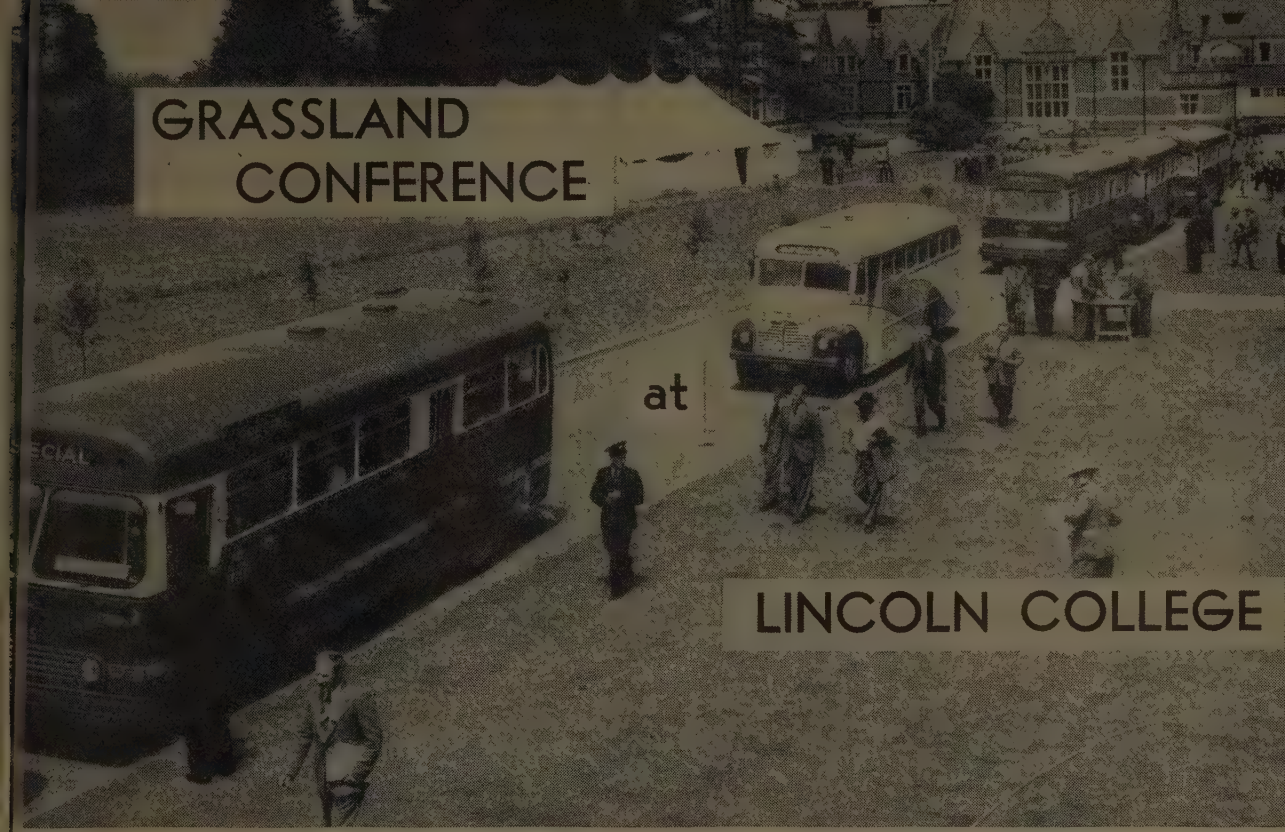
Warning

There is some tendency among a few pedigree breeders to blame the hybrid sow scheme for a falling off in demand for pedigree or purebred sows. From what has been said it will be clear that the whole scheme depends on pedigree stock of high productive quality. Breeders of stock of this quality, provided they have the test records to prove it, will be the breeders with a future.

What the commercial farmer must guard against is the acceptance of any first-cross sow as the equivalent of a National Hybrid sow. Such sows may have been produced from untested parents and their potential will be no better than the ordinary run of crossbred sows available in the industry today. Many breeders have been catering for the demand for first-cross or crossbred sows for some years, and the tendency for this trade to increase is testimony to the practical application of the principle of hybrid vigour. Unless hybrids have proven production backing, however, results are likely to be disappointing compared with those from a carefully bred animal such as a National Hybrid sow.

Carcass quality will become more and more important. Continued progress in improvement in this respect, as an example, is impossible without consistent application of a selection technique based on testing station methods. The stage is set for co-operation to this end.

Hybrids under test in progeny-testing house. The comfort and good health of the pigs are manifest.



THERE was a marked international atmosphere about the Eighteenth Conference of the New Zealand Grassland Association at Canterbury Agricultural College, Lincoln, at the end of November. The conference had been preceded at the beginning of the month by the Seventh International Grassland Congress at Palmerston North and 85 delegates from 15 countries who had filled in the interim by taking part in tours of both the North and South Islands attended the Lincoln conference, several of them contributing papers and many taking part in discussions.

"THIS is a notable year in the history of the New Zealand Grassland Association," said Professor J. W. Calder in his presidential address. "It is 25 years since the Association was formed and in this, its silver jubilee, it has acted as host to the Seventh International Grassland Congress. . . . I believe on an occasion such as this that it is appropriate for the Association to recognise and acknowledge the debt it owes to the pioneer grassland workers in New Zealand, farmers and professional workers alike. These men set in train, 40 or 50 years ago, the course of events which led to the present level of pasture production and management, to the formation of the New Zealand Grassland Association on 5 August 1931, and to the latest honour of being host to the Seventh International Grassland Congress."

The importance of agriculture and of production based on pastures in the national economy of New Zealand was illustrated by Professor Calder in a historical review of the development of primary industry. In referring to the changed face of the countryside as a result of the prosperity over the past 20 years, he said:—

"Thirty years ago in Canterbury we believed (1) that ryegrass pastures would not last more than 3 years; (2) that it was useless to apply lime to the land; (3) that it was unnecessary to sow white clover, as there was plenty of seed in the soil. What a revolution in knowledge and achievement has occurred since then!

"We can now expect, under our 25in. rainfall, high-producing pastures, based on ryegrass, to remain down for anything up to 10 years or more and support, according to soil type, 3 to 6 or more ewes producing fat lambs per acre."

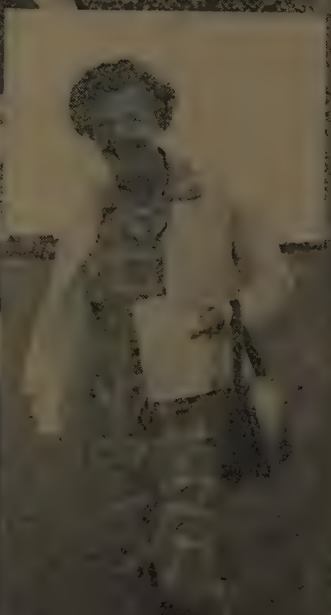
Prerequisites for these pastures were listed by Professor Calder as (1) application of 1 ton of lime every 3 to 5 years; (2) good cultivation and seedbed preparation for small seeds; (3) regular applications of 1 to 2cwt. of superphosphate per annum; (4) the use of certified strains of grasses and clovers; (5) grazing management practices that keep in circulation a high proportion of the nutrients of the herbage so that the pastures are continually being topdressed in the form of dung and urine of the grazing animals to stimulate the growth of more herbage.

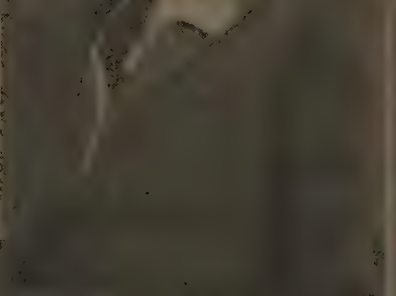
"These pastures and the system of husbandry associated with them," said Professor Calder, "are fertility building. It is the general experience of farmers that since the high-producing pastures have been introduced to their farms, crop yields have improved. On our College farm average wheat yields have increased over the past 15 years from 45 bushels per acre to 54 bushels per acre and the New Zealand average has increased over the same period from 32 bushels per acre to close on 40 bushels per acre.

"The good pasture," Professor Calder continued, "is the basis of good hus-

HEADING PHOTOGRAPH: A bus convoy prepares to leave for a field trip to Ashley Dene, the College light land property, where the introduction of subterranean clover and grazing lucerne has doubled production since 1938.

Grassland Conference Field Trip to Ashley Dene





Right—Dr. Ruth Allcroft, a New ... g in biochemical and nutritional problems of ... Veterinary Laboratory, Weybridge, Surrey, Engla...

... pasture of lucerne

bandry. Apart from functioning as the basis of the stock feed supply, it also functions as the major soil fertility building crop in the rotation. This is brought about by (1) increase in soil nutrients added in fertilisers; (2) increase in organic matter through the accumulation of decomposing roots, herbage, and dung; (3) improvement in biological activity of the soil; (4) improvement in soil structure associated with good root development, increase in organic matter, increased microbiological activity, and increased worm populations; and (5) increase in soil nitrogen from the improved growth of legumes encouraged by lime, phosphates, or trace elements from the decomposition of organic matter and from the urine of the grazing animals. All these complex reactions associated with good pastures are interdependent and their final expression is an improvement in the fertility of the soil.

"Apart from the basic requirements of good husbandry of keeping the land in good heart and stock in good health," Professor Calder said, "the homesteads, buildings, gates, and fences are well kept and cared for. This is a highly desirable state of affairs which does credit to the farmers and to other sections of the community who share in the benefits derived from a prosperous agriculture.

"We are constantly being reminded of the need for increased farm production which farmers will be called upon to supply during the next 20 years to provide food for an estimated population of three million people and to provide, from export of farm produce, the additional overseas exchange to maintain the standard of living of the increasing population.

"From 1885 to 1955, population rate increased by 1.8 per cent. per annum and farm production increased by 2.6 per cent. per annum in volume. I have no doubt that this desired rate of production increase will continue, but it will require an increased national appreciation of the need to provide the necessary conditions and facilities for increased farm production.

"The technical methods of increasing production are essentially known," Professor Calder said. "The individual farmer, however, cannot achieve results unaided. He can milk only a limited number of cows, shepherd a limited number of sheep, cultivate, sow, and harvest a limited acreage of crop. To produce more we must have more qualified farm labour and labour requires housing and amenities. The process of providing more labour on the land is proceeding, but it could be accelerated by public recognition of the fact that increased farm labour, farm housing, and family amenities are a prerequisite to increased production."

Grasslands in 20th Century

"Why all this talk about grassland research? What does it mean in terms of progress and of ultimate human happiness?" asked Dr. William Davies, Director of the Grassland Research Institute, Hurley, Berkshire, England, in summing up his opening address to the conference on grassland development in the 20th century. I believe it means an awful lot, not only to the farmers of this world, but to the wretched humans who so often are said to be too numerous on the face of the earth. That I refuse to accept. It is part of man's destiny to breed and to reproduce according to his likes. If the medical profession is to keep people alive, then we as agriculturists must see to it that they have the food on which to live healthily.

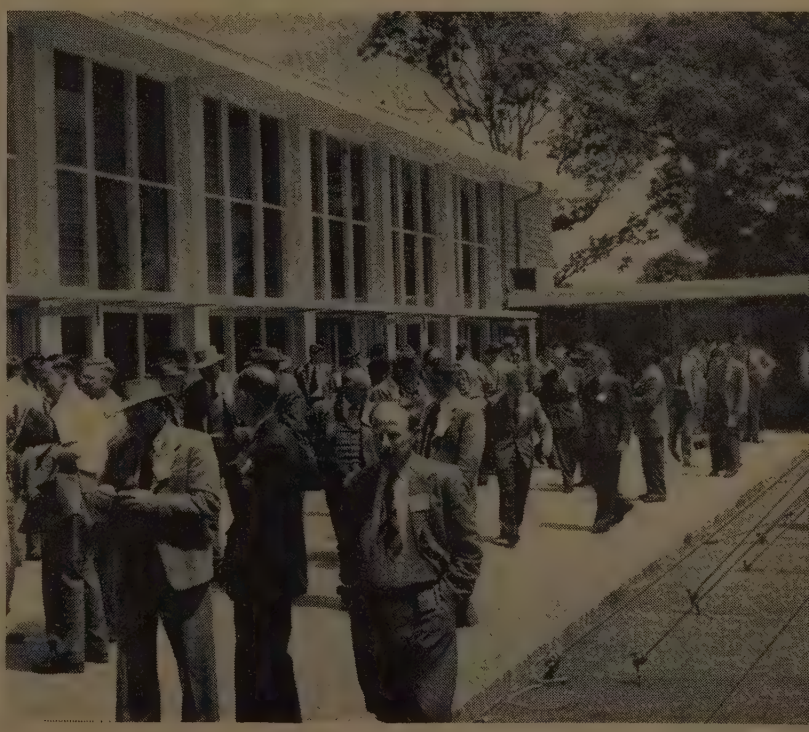
"Can we produce that food for an ever-increasing world population?" asked Dr. Davies. "I believe we can if we set about it and set our sights high enough. Let me take an example. The lowlands of Britain are allegedly well farmed, but the hills of Britain have never been so farmed. True, there are a few ideas floating around which suggest that they may be farmed in the future. Climatically, there is no reason why we should not grow first-class pastures on every acre in Britain, including the steep hillsides of Scotland and of Wales. It may not always be the best way to use the land, for in some cases it is clearly better to cultivate forest trees. All I say is that technically it is possible to grow first-grade pastures everywhere in Britain, including our peat bogs and our steep escarpments. I realise that my view will be challenged, but I am always ready to meet that challenge from whence it comes. I only reiterate my belief as regards the remainder of this century and as regards the more distant future.

"I have been privileged to go round the North Island of New Zealand, and the same is true throughout that beautiful countryside," continued Dr. Davies. "It is more than 25 years

"Proceedings" of Conference

TITLES of papers and names of speakers appear on page 128. The printed "Proceedings", incorporating discussion of papers, will be sent to members and overseas visitors who were honorary members for the conference. Orders for requirements of copies other than these (price 15s.) should be placed early with the Association's secretary, Box 2298, Wellington.

▼ A between-sessions scene outside the College refectory block.



since I made an extensive tour of the South Island, and other than the Tasman Glacier and a few spots like it, there is no reason why the same should not be true for the South Island of New Zealand. Some of your steeper hillsides might be better under forest than under grass and some of your river valleys may also be better under trees instead of grass. It is up to you to keep your rivers in check by one means or other. This again is a subject for research and investigation."

The same broad picture was true throughout northern Europe and North America, including snow-bound Canada, said Dr. Davies. It was true of Australia. The problems of southern Australia had been taken to a point where solution was in sight. The problems of tropical and sub-tropical Australia had hardly been touched upon, but for the first time an attempt was being made to tackle them with agronomic eyes. Similar remarks could be applied to Rhodesia, South Africa, Kenya, and East Africa generally. The same was true of the whole of the continent of South America, though some of the best work in that area was still in its preliminary stages.

"When all this work gets under way," Dr. Davies concluded, "I believe the world will find that the tropical and temperate problem is basically one, and the grassland agronomist will then have pointed the way toward providing **more food for more people on an ever-increasing scale.** I am afraid I am not a believer in the view so often put forward these days, that the world will attain a ceiling of food production and any human arriving after that time will just have to starve because no food can be grown for him. I believe so earnestly in the human race that I think it will grow its food in greenhouses rather than starve. . . . The crop with which we as grasslanders have to deal is the most important in the world and its proper development is a keystone upon which the world must learn to build."

Officers : Future Conferences

The following officers were elected at the annual meeting of the Association during the conference:—

President, S. H. Saxby, Department of Agriculture, Wellington; immediate past president, J. W. Calder, Canterbury Agricultural College, Lincoln; vice-president, L. Corkill, Grasslands Division, Department of Scientific and Industrial Research, Palmerston North; secretary, R. H. Scott, Department of Agriculture, Wellington; executive committee, the foregoing with the addition of J. E. Bell, Department of Agriculture, Auckland, and C. E. Iversen, Canterbury Agricultural College, Lincoln.

Hamilton was confirmed as the venue of the conference in 1957 and Dunedin would be recommended to the next executive committee as the venue for the 1958 conference.

Prizes for Betterment of Grassland

The recommendation of a sub-committee that awards consisting of a parchment citation and £50 be made by the executive committee of the Association for outstanding contributions to the betterment of grassland in New Zealand when it considers work worthy of recognition was adopted at the annual meeting. The executive committee would consider the desirability of making awards at its first meeting in each financial year.—*G. J. N.*

GRASSLAND CONFERENCE AT LINCOLN

S. H. Saxby (left), incoming president of the Association, and C. E. Iversen, a member of the executive committee whose paper on the management of the Ashley Dene light land property was a high light of the conference.

Papers and Speakers

"Grassland Development in the Twentieth Century", William Davies.

Presidential Address, J. W. Calder.

"Techniques of Land Development in New Zealand", P. W. Smallfield.

"Canterbury Pastures in Relation to Cropping and Small Seed Production", E. G. Smith.

"Problems of Managing Grassland under Low Rainfall Conditions in South Africa", J. D. Scott.

"Some Mineral Deficiencies and Excesses in Cattle and Sheep in Britain", Ruth Allcroft.

"Economics of Farming Light Land in Canterbury", R. H. Scott and R. C. Stuart.

"Light Land Pastures", C. E. Iversen and J. W. Calder.

"Some Results and Problems from Experiments at Winchmore Irrigation Research Station", G. K. McPherson.

"Problems of Irrigating Grassland in Canterbury", C. Hilgendorf.

"High Country Grassland in New Zealand : Characteristics and Problems", L. Chapman.

"High Country Grazing in the Western United States", R. Merton Love.

"Tussock Grassland Problems under Irrigation in New Zealand", J. M. Hercus.

"Grazing Standards", Lincoln Ellison.

"General Grassland Problems in the Netherlands and Neighbouring Countries", M. L. 't Hart.

"Results of Silage Investigations with High Protein, Unwilted Forage of New York State College of Agriculture", W. K. Kennedy.

"A Comparative Account of British Grassland Farming", M. McG. Cooper.

POTASH TOPDRESSING

THE study of potash deficiencies occupies a large place in field experiments by the Extension Division of the Department of Agriculture. At present 380 observational trials and many measurement trials on pastures, lucerne, and potatoes are being conducted.

DEFICIENCY SPREADING

THIS large number of experiments is necessary to keep up with the potash deficiencies which are developing or are believed to become more acute in district after district. For instance in southern Hawke's Bay very slight growth responses to potash were observed in field trials as far back as 1935, but hardly any potash is used in that district. Recent evidence points to a quite pronounced deficiency in some fields and it is hoped that for the sake of increased production potash topdressing will become more general.

At Marton Experimental Station quite good growth responses to potash applications are now obtained on pastures and on potatoes, though earlier no growth response was obtained. The soils represented at the Marton station cover an area of about 200,000 acres. Outside Marton on the same or similar soils 9 out of 14 observational trials indicate slight to very good responses to potash topdressing.

In Northland there are large areas of molybdenum-deficient soils which have not been farmed intensively in the past but which are expected to require potash topdressing a few years after pastures have been improved. Accelerated pasture improvement is believed to take place owing to the discovery of molybdenum deficiency, the widespread use of aerial topdressing, and the ability of farmers to finance improvements. Soils on which the development of potash deficiency is being studied by field experiments are the so-called "semi-volcanic" soils and the poor clay soils derived from sandstone. These soils alone occupy a very large area, well over one million acres, a small proportion of which is being brought into high-class pastures every year.

RATES OF APPLICATION

Since potassic fertilisers are costly, accurate knowledge of rates of application for maintenance and initial dressings is essential. Desirable rates of application vary with soil type and with the kind of management a field receives. A good hay crop, for instance, may withdraw the equivalent of 1½cwt. to 2cwt. of muriate of potash per acre. It is not unlikely that this loss should be replaced in full by additional topdressing on certain soils already deficient in potash.

There is considerable experimental evidence that on severely potash-deficient fields on the friable soils derived from volcanic ash in Taranaki, Waikato, and south of Auckland dressings of 2cwt. of muriate of potash or even more are much superior to 1cwt. per acre. How far these rates are economic will have to be proved by farming experience. On very deficient fields an initial dressing of 1cwt. of muriate of potash per acre may be inadequate, and some trials appear to indicate that higher rates of application are more economical.

There is a possibility, however, that some economy can be achieved by using occasionally common salt with potash or salt alone on certain soil types in the Waikato basin and the Bay of Plenty. Further experimental work is needed before definite advice on the use of salt can be given.

TIME OF APPLICATION

A change of severe deficiency to adequacy of potash as a result of topdressing is usually accompanied by temporary clover dominance. This may cause a high incidence of bloat.

Potassic fertilisers should be used by farmers, or at least tried by them, before pasture deterioration has gone too far. If this is done, many years of low production may be avoided, the need for using high rates initially may not occur, and clover dominance may not become troublesome. Instructors in Agriculture are able to say which fields are likely to be or to become potash deficient; in this they are helped by the soil testing service.

What limited experimental evidence is to hand points to spring as the best season to apply potassic fertilisers.

SOUTH ISLAND

In the South Island as a whole potash deficiency is of far less economic consequence. Nevertheless the use of potash is being found to be essential on a number of soil types. Replicated mowing trials are being conducted at Winchmore, near Ashburton, and at Invermay, near Dunedin. The only measured response occurred at Winchmore from 1cwt. of muriate of potash per acre on irrigated lucerne. The soil type is Lismore stony loam.

Of the 150 observational trials only 10 per cent. have shown growth responses to potash. The soils most likely to be deficient in potash seem to be:—

Soils containing much granite, particularly associated with high rainfall or much cropping. These occur in the Nelson, Buller, and Takaka districts and are represented by the Karamea, Sherry, Buller, Hokitika, and Ikamatua soils. All have a high potential production in districts where the area of such soils is very small. More use should therefore be made of the advice of the local Instructors in Agriculture in pinpointing potash-responsive fields.

There is little evidence that potash is important in Canterbury and Marlborough, except perhaps for special crops, such as irrigated lucerne on the light, stony soils of Canterbury. In Otago and Southland potash deficiency seems widespread only on the Edendale soils, though there is evidence from individual field experiments that it may exist on the related Drummond and Tisbury soils. These types occur over quite a large area of flat to undulating land near Invercargill. It is not unlikely, therefore, that in the near future in Southland, as in the North Island, potash deficiency may become more severe on areas so far only slightly affected.

—C. DURING

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Trees Suitable for Northland

THERE are often requests for names of tree species suitable for certain localities, and to meet this need lists are being compiled by district officers of the New Zealand Forest Service. These district lists will be published from time to time. In presenting a list of trees suitable for Northland, W. H. Jolliffe, Extension Forestry Officer, New Zealand Forest Service, draws attention to the wide range of site conditions present in Northland and consequently the need for care in choosing from among those recommended species which would be most suitable for the particular site.

Young kauris for planting out raised under the protection of a "bush house", an open-sided shelter.

SPECIES of timber-producing trees recommended for growing in Northland are as follows; their suitability is limited only by certain site conditions:—

Agathis australis (kauri) is fairly tolerant as to site provided there is some shade in the early stages, for which manuka is very useful. The kauri transplants well if the roots are balled or in tubes and fairly well even if planted open rooted.

Cryptomeria japonica (Japanese cedar) tolerates a wide variety of soils. It does best with early shelter and so is useful for under-planting cut-over bush or open-growth exotics.

Cupressus lusitanica var. *benthami* (Bentham's cypress) is more disease resistant than macrocarpa and is useful for damper sites provided they are not subject to salt winds. It is a promising species in Northland.

Cupressus macrocarpa will tolerate quite heavy clay soils, but should not be planted on wet sites. It is one of the best species for planting where salt winds are common.

Eucalyptus species: Some of the vast group of eucalypts are well suited to Northland soils. Probably the best all-round species are *E. botryoides* and *E. saligna*; the former will grow on really hard pan soils and both tolerate salt winds well. *E. siderophloia* is a durable ironbark suited to clay country, and *E. pilularis* does well on all but the poorest soils. The latter is, however, difficult to transplant.

Pinus radiata is suitable in Northland only for the better soils and should never be planted on gumland soils or on other poor types. It tolerates salt winds fairly well.

P. caribaea (slash pine) tolerates practically all soils except those with a hard pan. It will stand fairly moist conditions, but not exposure to salt winds.

P. taeda (loblolly pine) is similar to *P. caribaea* but is somewhat less tolerant.

P. pinaster (maritime pine) is very hardy in Northland, but some strains of it do not develop into trees of very good form. It is fairly tolerant of salt winds.

Robinia pseudacacia (robinia or false acacia) is promising on the better soils and will stand quite heavy clay. It produces durable timber fairly quickly.

Vitex lucens (puriri) is a handsome native tree producing a durable timber. It is easily established and quick growing provided the soil is good.

There are some species which are not recommended as timber trees but which are useful for other purposes and for growing under certain conditions. These include: *Acacia melanoxylon*, mixed with eucalypts; *Eucalyptus ficifolia*, which will stand strong winds; *Ficus macrophylla* (Moreton Bay fig), which will endure salt winds, *Metrosideros excelsa* (pohutukawa), a coastal tree, and *Myoporum laetum* (ngaio), a coastal tree.

Species which are in more or less common use in other parts of New Zealand and may succeed as garden specimens in Northland, but which are not recommended for forest use there, are:—

Betula alba (European silver birch), *Eucalyptus amygdalina*, *E. ovata*, *Fagus sylvatica* (English beech), *Larix decidua* (larch), *Picea excelsa* (European spruce), *Picea sitchensis* (Sitka spruce), *Pinus murrayana*, *P. ponderosa*, *P. strobus*, *Pseudotsuga taxifolia* (Douglas fir or Oregon pine), *Sequoia sempervirens* (redwood), *Thuya plicata* (western red cedar), and *Tsuga* spp. (hemlocks).

Hedge Plants

There are quite a number of hedge species which a local nurseryman could recommend for certain conditions, but those known to have been widely successful on poor soils are: *Acacia verticillata* (prickly acacia), which tends to open out unless kept trimmed; *Eleagnus parviflora*, which can be used also in conjunction with tall shelter trees; *Hakea saligna*, which tolerates poorly drained clay soils; *Pittosporum crassifolium* (karo), which can be used on dry sites in conjunction with tall trees.

All of these will grow quickly and are resistant to salt winds.

Improvement of Tussock Land Omarama

Clover growing profusely among tussock vegetation. Good strikes are obtained where there is sufficient cover to protect the seedlings from the extremes of climate that are common in the area.

Typical undulating downlands near Lake Ohau which grow excellent red and white clover. Topdressing is done during winter with 2cwt. of superphosphate per acre.

As the inland high tussock country is improved by modern methods such as aerial topdressing and oversowing and carrying capacities are consequently improved the necessity arises of having to provide adequate winter feed. On "Ribbonwood" this has been done largely by setting aside areas for hay, and upward of 3000 bales have been made in a year.

High-country in the District

IN recent years increasing interest has been shown in the development of the inland high-country tussock grasslands of North Otago and elsewhere in the South Island. This article by D. G. Reynolds, Instructor in Agriculture, Department of Agriculture, Oamaru, describes development work which has been done to improve tussock land in the Omarama district, North Otago.

THE Omarama district of North Otago has considerable variation in both soil and climate. Around Omarama itself rainfall is as low as 12in. to 14in. a year and the soil is mainly light and gravelly. Further to the west the rainfall begins to rise appreciably until it reaches from about 32in. to 35in. in the region of Lake Ohau. Where there is this higher rainfall there are several areas of better-class silt and clay loam. Also of note are extensive areas of semi-swamp country where a high water-table reduces the effects of periodic droughts.

This variation in soil and climate is most important in the consideration of development work, for which this area can be divided into three main categories:—

1. Country with a rainfall of over 24in. and semi-swamp country which is capable of responding well to aerial topdressing with 2cwt. of superphosphate and oversowing with up to 6lb. of clover seed.

2. Silts and clay loams which may be cultivated to establish pasture and lucerne where the rainfall is 22in. and higher.

3. The semi-swamp land where in spite of low rainfall the high water-table provides adequate moisture to enable establishment of pasture and lucerne by cultivation.

None of these categories can be termed low-rainfall tussock country. The fact that moisture is adequate is the key to the possibility of their development.

HEADING PHOTOGRAPH: An area of hard tussock oversown with clovers in the Omarama district. The white clover in the foreground has established well.

Value of Aerial Topdressing

Aerial topdressing during winter undoubtedly affords the greatest scope for economic development of this class of country. There is conclusive evidence that a good cover of tussock or other natural vegetation aids establishment by protecting the seedlings from extremes of climate. The success of the strike depends almost entirely on the weather in the following spring, and sometimes the treatment has to be repeated the following year. The main clovers used are red, white, and alsike. On some of the stony, unploughable flats 1 ton of lime is necessary, at considerable cost, before good establishment and growth can be expected.

The cost of establishing pastures or lucerne on cultivated land is fairly high because of distance from markets. The usual rotation is to take one or two crops of turnips or greenfeed and to sow to pasture or lucerne the following December or January. Some excellent pastures have been obtained this way. Lime and superphosphate are necessary but costly.

Pasture mixtures vary, but one that was used with success in the district was 10lb. of perennial ryegrass, 10lb. of cocksfoot, 2lb. of crested dogstail, and 2lb. of timothy, with white clover and Montgomery red clover. Lucerne can also be established successfully. Both the pasture and lucerne will provide good grazing and hay, and in suitable seasons quite good seed crops, particularly of cocksfoot, can be harvested.

The main limiting factor to carrying capacity is the long, hard winter with snow risk, and any long-term development programme must aim at providing good winter forage, mainly in the form of hay, before other improvements can be expected to give worthwhile returns.

Programme at "Ribbonwood"

Mr. R. K. Ireland's property "Ribbonwood" has for several years now been a good illustration of the points mentioned. In 1924 Mr. Ireland began an intensive programme of development at "Ribbonwood" involving the cultivation of large areas of flat land and the establishment of improved pastures and lucerne. In recent years much of the hill country on the property has been topdressed and oversown from the air. Stock numbers rose from 4300 sheep and no cattle in 1924 to 6300 sheep and 140 cattle in 1952. During the same period the wool clip increased from 89 to 180 bales. To overwinter these large numbers of stock 3000 bales of hay were made and in some years a further quantity has been bought in. The photographs reproduced on the opposite page were taken on this property in 1955.

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Prairie Grass Used to Advantage in Dairy Pastures

By B. T. JORDAN,
Instructor in Agriculture, Department of Agriculture, Tauranga

BARE and weedy ground along hedgelines has long been a source of concern to many dairy farmers. To avoid losses many farmers have either trimmed a hedge so hard that it is no longer effective against winter winds or have done without hedges altogether. A dairy farmer at Omokoroa, Tauranga, has evolved a practical and useful method to overcome this problem by adding prairie grass to the standard mixture sown along the hedgelines.

HEDGES usually border the most fertile strip of every field because of heavier stocking and camping in these areas. Therefore, it appears that many farmers are failing to utilise their richest soils.

Break grazing of pasture (left) and prairie grass (right). After being closed in late autumn the pasture is ready for a second grazing and the prairie grass for a third.

Where new pasture has been sown at Omokoroa a strip 10yds. to 15yds. wide along the hedgeline has been sown with prairie grass as well as the standard pasture mixture. Seeding rates have varied, but the average would be 55lb. of prairie grass per acre.

Two- to 3-weeks-old calves running on prairie grass planted along hedgelines.

Where the paddock has not previously been cultivated the ground can be worked up with discs, prairie grass seed oversown, and the seed covered with harrows.

Winter Feed Value

Prairie grass is well known for its winter production and the illustration at the top of the page shows the importance of the grass in providing three grazings to the two grazings from the ryegrass pasture over the same period.

Prairie grass about to be grazed for the third time in 4 months.

With the use of the electric fence small areas like these can be utilised to the full by early calvers or herds on town supply. When the whole paddock is ready to be fed off the prairie grass presents no problem, as it is utilised with the rest of the pasture.

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No.3

Causes of Damage to Pip Fruit during Harvesting

By I. L. BROWN,
Horticultural Instructor, Department of Agriculture, Nelson

▲ Bumping a picking bag containing fruit against a ladder, a common source of fruit damage.

BY good cultural practices New Zealand growers of apples and pears produce high-quality fruit free from insect pests and diseases. The attraction that such fruit has for the consumer can, however, be lost if the appearance is marred by bruises, scratches, punctures, and cuts caused during harvesting and subsequent handling. Damage of this nature can be done to fruit by careless and rough handling at any point from tree to consumer. Beyond the orchard gate the delivery of sound fruit to the consumer is mainly the problem of the marketing authorities and distributors. Within the orchard the handling of fruit without damage remains the problem of the fruit grower and must be given as close attention as any of the other essential cultural operations.

PREVENTION of all marks and bruises is probably impossible, as during harvesting apples and pears are unavoidably subjected to considerable handling. Modern methods and equipment have done much to reduce handling or make it easier, but much avoidable damage still occurs. Fruit not in the best of condition for handling, faulty or dirty equipment, and rough or careless handling by orchard workers all contribute to fruit damage.

Condition of Fruit in Relation to Damage

Harvesting of apples and pears should begin as soon as the fruit is mature enough to ensure that it will develop its full flavour and quality after picking. Fruit picked too early, though firm and hard and thus easier to handle without damage, will wilt or shrivel and generally be of poor quality if stored. Conversely fruit picked near full maturity has better eating qualities, but has a much shorter storage life and is more subject to damage because it is soft.

Fruit must therefore be picked when between these two limits and the operation timed to ensure that the maximum quantity is handled while it is in the best condition. Thus special precautions to avoid damage to soft fruit should not be necessary. If picking is delayed for any reason until the fruit has become advanced in maturity or if a particularly tender variety is being handled, special efforts must be made to avoid damage.

Damage during Picking

The first damage to fruit during harvesting can be caused by incorrect picking. Pickers, particularly if inexperienced, should be instructed how to handle fruit without damaging it. They should be provided with clean picking bags, aprons, or buckets, and equipment, such as ladders, should be in good condition, safe, and easy to use. Provision of good equipment encourages better work from staff.

If fruit is pulled roughly from spurs or twigs, stems are often torn from the apples or pears or parts of the spurs from the tree. Tearing the stem from the fruit ruptures the skin at the bottom of the stem cavity, thus providing easy entry for fruit-rotting fungi during storage. Parts of spurs and twigs or leaves picked with fruit can cause marking or punctures on fruit in picking bags, cases, and bins used for bulk harvesting and on the sorting tables of the sizing machines in the packing shed.

Careless picking is often the forerunner of further rough handling. Marked and bruised fruit is then inevitable.

Gripping apples, particularly tender or soft-skinned varieties, too firmly with the fingers can cause numerous small bruises. Long or pointed fingernails also cause damage. If injury from these two causes is common, growers should consider providing light cotton or similar gloves for the workers. This precaution has given good results when tender-skinned varieties were handled.

Much of the type of damage referred to can be avoided if pickers are instructed to remove fruit with an upward, twisting movement—a rolling action rather than a pull. If some fruit proves difficult to remove from the spurs or laterals, the procedure recommended can be supplemented by pressure with a finger or thumb at the point where the stem and spur join.

Further and more severe bruising can be caused if the fruit is dropped into the picking bags, aprons, or buckets. Fruit can also be bruised if pickers do not move carefully round trees or to cases or other containers to empty their full bags. Bumping bags containing fruit with the knees against tree branches, ladders, or other solid objects is known to be the cause of serious damage. Such damage is more prone to happen if picking bags are overfilled and thus made difficult to carry or handle.

During the transfer of fruit from bags into cases or trailer bins bruising can occur if the fruit is dropped even a few inches into empty or partly filled containers, and cuts and punctures can be made if the fruit is emptied roughly against case edges or on to other fruit.

If cases are being used to carry the fruit to the packing shed, they should not be overfilled. Fruit above the level of the top edge of a case will obviously be bruised if other cases are stacked on top. This precaution of not overfilling applies equally to bins used for bulk harvesting. Pickers often have difficulty in emptying full picking bags on to the top of overfilled bins, and if the variety being handled is tender, damage results.

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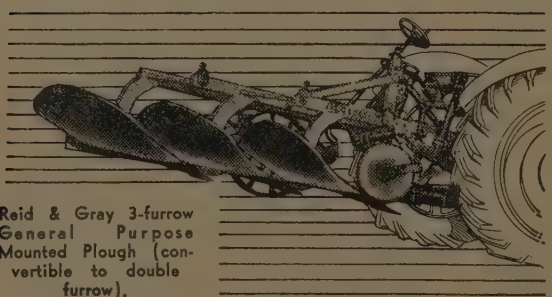

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Damage during Transport to Packing Shed

Many growers have eliminated some of the damage to fruit during transport to the packing shed by the adoption of bulk-harvesting methods. However, carelessness during transport of the fruit by any method can cause injury.

Lifting and stacking cases of picked fruit on to tractor trailers or motor trucks are an obvious source of injury. Fruit can be bruised if cases are dumped or jolted while being handled. Bad stacking of cases on top of one another so that some rest on the fruit below occurs too frequently.

Bulk-harvesting equipment eliminates injury caused through handling of cases, but loaded trailers or bins must still be moved carefully from the orchard to the packing shed. Rapid movement over rough or uneven surfaces can cause the fruit to bounce, and scratching and scoring are frequently caused by movement of the fruit against the sides and ends of bins. Gravenstein and Jonathan are two varieties which have been found to suffer this type of damage more easily than many others.

Fruit in cases is often bruised by rough unloading and stacking at the packing shed.

Damage during Sorting and Sizing

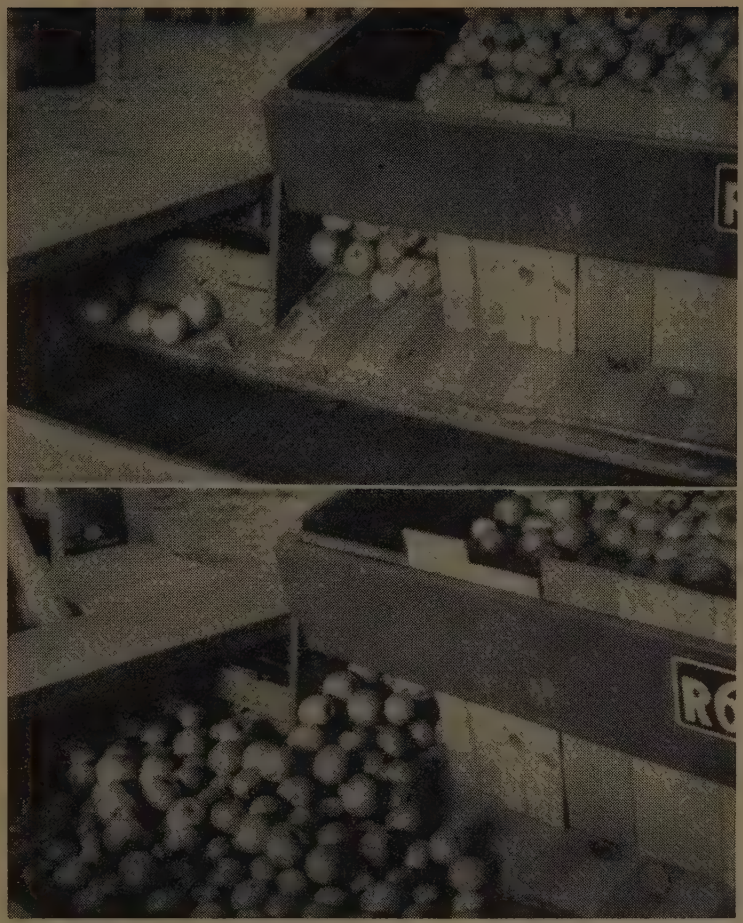
There are many opportunities for damage to occur to fruit while it is passed over the machines in the packing shed. These should be kept clean and in good order so that the fruit is moved gently and without bumping or dropping against dirty or damaging surfaces.

If the hoppers or bins into which the fruit is fed either mechanically or by hand are allowed to become dirty or cluttered up with parts of twigs and leaves, fruit will be marked or punctured.

Dust, spray residue, and wax from the skin of the fruit also accumulate on all parts of the machines. Belts, rollers, and other parts with which fruit comes in contact gradually become coated with small lumps of this kind of dirt, which become hard and can seriously mark fruit.

All parts of the sizing machine must be cleaned regularly if unsightly marking of the fruit is to be avoided. Regular brushing (daily when some varieties are being handled) with a stiff-bristle brush must be done if the dirt and wax are to be prevented from hardening on surfaces. Woodwork and composition or rubber belts can be scraped or brushed with wire brushes. Felt-covered surfaces are best cleaned with a firm-bristle brush. Dirt hardened on felt-covered surfaces can be loosened before brushing with a cleaning fluid such as white spirit.

DAMAGE TO PIP FRUIT DURING HARVESTING



Sudden rushes of fruit after the flow from bulk-harvesting bins has been checked are dangerous.

Dumping of fruit from case to hopper by hand often causes bruising if the fruit is not tipped out of the cases gently or if a sudden rush of fruit is allowed. With bulk harvesting this handling into the grader hopper is eliminated, but bruising can still occur if the fruit is allowed to move too rapidly from the bin on to the conveyer belt.

Fruit allowed to bump or drop against other fruit or hard surfaces will suffer damage.

Grading staff should take fully as much care as pickers. Not all the fruit is handled by them, but the proportion that is should not be dumped or thrown on to grader belts or into cases. The fruit which flows past the graders on many sorting tables can also be damaged if the flow of fruit is restricted or held back by hands or arms. Holding back of the flow of fruit heaps the fruit up and holds it against the moving rollers or belts, which can mark the skin of many varieties.

Damage during Packing

Much fruit can be bruised during packing or because of the way in which the fruit is packed.

All workers in the packing shed, particularly those packing the fruit, should make certain that the bins receiving the graded and sized fruit are clean and that the fruit is protected from damaging surfaces. An accumulation of dust and dirt on the bottoms of bins is a frequent cause of fruit marking. Rough canvas or other material has also been known to mark tender-skinned varieties. Bins should be emptied regularly and cleaned thoroughly. Allowing the bins to become overfull is also a

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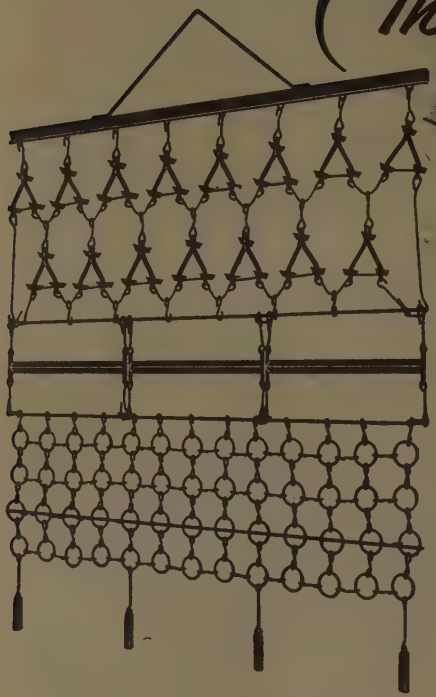

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source of damage, especially if fruit is heaped up by hand. When this is being done, even carefully, fruit may be bruised or punctured by the stems.

Careful handling in all the prior stages is of little use, however, if the fruit is not properly packed. During packing fruit can be bruised if, in an endeavour to gain speed, the packer bumps the first layer on the bottom of the case. More bruising occurs when fruit is bumped or pressed too firmly against that in the layers below as packing proceeds.

Failure to pack fruit by the proper method causes serious bruising. Apples and pears are more seriously bruised through incorrect packing than by any other fault in the orchard or shed.

A properly crowned diagonal pocket pack allows each fruit to sit in the pocket formed by the four apples or pears above and below it instead of pressing directly on one or two of these surrounding fruits. Placed squarely and in correct alignment each fruit in the case can rest firmly without being subjected to undue squeezing or pressing against neighbouring fruits.

Common packing faults which have been found to cause bruising are slackness, too tight or too high a finish, twisting or screwing of the fruit, and bad alignment. Fruit packed slackly into a case can move and bump about when handled. Too much movement causes bruising.

A pack which is too high or too tight has no elasticity and the fruit therefore suffers when the lid is pressed on as it is being affixed. A slight bulge is necessary to achieve sufficient firmness, but this should not be allowed to become excessive. A good diagonal pocket pack finished with a crown can be lidded with safety. Crowning is achieved by lightly pressing down the fruit at the ends of the case as each layer after the first is completed. This helps to consolidate the pack and forms the slight bulge desired, but keeps the fruit from rising too far above the ends of the case.

A well-formed diagonal pocket pack. The case is a special one with clear plastic panels in the ends used for demonstration purposes.

Twisting and screwing as well as bad alignment of the fruit in the tiers or layers prevent the formation of a good pocket pack. Fruit so packed can become loose or, if packed tightly, can cause bruising and punctures. Punctures occur when the stem of one apple is placed against the surface of one next to it.

All apples should be packed so that they sit on the cheeks with the stem ends pointing toward the end of the case away from the packer, except that at each end the stems should face into the case. This avoids punctures by the stems when they rest between the fruit and the ends of the case.

A poorly packed and wrapped case. It is untidy and the fruit has been damaged by rough packing.

Damage during Lidding and Wiring

Lidding and wiring, the final stage of the preparation of fruit for dispatch from the orchard, can also be a source of fruit damage. It has been noticed that packed cases of fruit waiting to be lidded are often stacked on top of one another. This must cause some squashing of the fruit in the bottom cases, which will be supporting a weight of 40lb. or more. Much less pressure than this has been proved to compress the flesh of apples.

Greater pressure is often exerted on fruit in packed cases by manually operated lidding presses, particularly when cases are packed too high and tight without a well-formed crown. Under these circumstances the fruit is crushed into the case by the operator when the arms of the lidding press are forced down on the lids before nailing.

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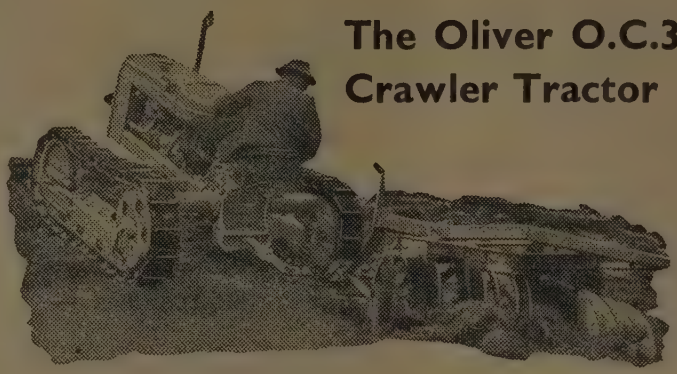

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▲ Injury to fruit can be caused when it is packed twisted and out of alignment.

▲ Fruit packed too high at the end of a case will bruise and crush when the lid is affixed.

To avoid this damage staff engaged in lidding should be instructed to press down the fruit at the ends of cases lightly if this has not been done by packers. They should also be instructed to refuse to lid cases considered to be packed too high or too tight.

Incorrect adjustment of the arms of lidding presses can accentuate this trouble. These should be adjusted so that they press on the lids as near to the ends of the cases as the fastening of the cleats will allow.

Mechanical lidding and nailing machines can cause damage similar to that resulting from manually operated equipment, particularly when the packed fruit is above the level of the ends of cases.

Damage by Handling of Lidded Cases

Rough handling by operators while wiring and stacking the finished cases can also be a source of bruised fruit. Standing on the sides of packed cases to reach the top of a stack or bad stacking also causes damage. The use of roller conveyers for shifting the fruit from the lidding press can also be a source of trouble. Cases placed on these conveyers and pushed so that the weight of several cases presses against a bulged lid can cause bruising, particularly if a row of cases is bumped together like railway wagons are shunted.

Those responsible for handling the cases on to trucks for transport from the orchard should also handle cases carefully. Many are inclined to regard a case ready for shipping as a solid object which can be handled without damage.

This care should also be exercised by transport operators, as rough and careless stacking of fruit can cause damage. Fruit in the cases can also be damaged by the ropes used to hold a load of fruit on a motor truck, as the sides of cases are not rigid and can be depressed by a tight rope far enough to bruise or crush apples and pears. If no other protection from this damage is used, the ropes should be placed as near as possible to the ends of the boxes, where the boards are more rigid.

Other Causes of Damage in Orchards

There are several other causes of fruit damage in the orchard and packing shed. One of the most common of these is faulty construction of the cases used for holding both the picked and packed fruit. If the boards comprising the sides, tops, or bottoms of the cases are assembled so that a wide space is left between them or to one side, the edges of the gap so formed can easily damage fruit like apples and pears. Most damage occurs after the fruit has been packed.

Not using enough nails or placing the nails too far from the edges of the boards can also cause similar damage. At the time of packing such a case may appear sound, but after it has travelled a short distance the edges of the boards tend to curl, leaving a damaging gap.

Too often nails driven into the timber, either during the making of the case or during lidding, so that the points protrude are allowed to pass unnoticed. Inside the case these "shiners" cause a lot of punctures in fruit. Outside the case they can cause serious injury to anyone engaged in lifting or moving both empty or packed cases. A quick inspection after the cases have been made or lidded should enable these causes of damage to be eliminated.

Faulty construction, rough surfaces, or edges of warped boards in the bins or trailers used in bulk handling can scratch and score fruit considerably.

The timber used for making cases should be checked for faults. Large knot holes, flimsy boards, or boards of incorrect dimensions can cause damage to, or even the loss of, the contents of the case long after it has left the orchard. Thin boards bulge more readily than their firmer neighbours, leaving a ledge or gap to cut and bruise fruit. Boards which are too thin or weakened by knot holes often break under the strain of handling. Broken cases mean damage and loss of at least some of the contents.

Faults Often Overlooked

A long list of faults in handling has been given and though the points mentioned are probably well known to many orchardists, Horticulture Division officers find that many simple faults are overlooked during the busy harvesting season. Only by constant attention to all the problems, small or large, connected with careful handling and by the proper use of well-designed equipment can the standard of the fruit be maintained from tree to consumer.

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Improving the Strain of Bees

Seasonal Notes for the Domestic Beekeeper

Drone brood from a selected hive. To get drone cells no foundation was used in this frame.

THE aim of every beekeeper should be the improvement of his strain of bees. This can be done by breeding queens from colonies that have produced good crops and are easy to handle and show little inclination to swarm. A. W. Bennett, Apiary Instructor, Department of Agriculture, Hamilton, explains in this article a simple method of rearing a few queens.

GOOD crops of honey cannot be secured from a poor strain of bees. An endeavour should therefore be made each season to secure a few new queens either by rearing them or buying them from a well-known queen breeder. In even one year the beekeeper will find he has so improved the strain of bees that they not only give him a greater surplus of honey but are a pleasure to handle. From the domestic beekeeper's point of view the pleasure he gets when handling his bees must be counted a profit as well as the honey he takes.

In queen rearing one of the most important items often forgotten is the presence of large numbers of selected drones. These should be produced from a colony which has shown qualities similar to those of a colony from which a breeder queen has been chosen. In some cases drones from the same hive may have to be relied on. A comb with plenty of drone cells should be inserted in the hive well before queen rearing is started. The aim should be to have the selected drones about a week old before queen rearing begins.

Comb from a breeder hive cut away at the bottom and placed in a queenless and broodless hive. After the first day queen cells can be noticed.

For the domestic beekeeper wishing to produce only a limited number of queens in a very simple and straightforward manner the following method perhaps is as good as any. After the beekeeper has selected the colony from which the queens are to be produced he should insert into the middle of the colony a comb that has not been used previously for brood rearing. In 3 days this comb should have plenty of eggs deposited in it and be ready to be cut and placed in the cell-building colony.

This colony should be fairly strong with at least a full box of bees. From this is taken the queen and all unsealed brood which can be formed into a nucleus for the time being. This should be done the day before the comb containing eggs is given to the queenless bees for cell building. At this stage honey or sugar syrup should be fed. Being queenless for 24 hours and having no means of producing a queen these bees will be in good condition for queen-cell building.

The comb which has been inserted into the breeder colony is now removed. It should be examined and the lower portion of comb cut off so that a row of cells containing eggs is left along the bottom edge. This comb is now put into the middle of the cell-building colony, which will quickly start cell building along this

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cut edge. Five days after the cells were sealed over, or on the 14th day after the eggs were laid, these cells will be ready to be cut from the comb and be inserted into the hives for requeening. When cutting out the queen cell the beekeeper should cut well up into the comb to leave the queen cell with a piece of comb attached; through this a piece of wire can be pushed to make an ideal fastening when the queen cell is introduced into the hive to be requeened, with very little or no chance of damage to the queen cell. Should more cells be built than are required, the beekeeper should select the cells that are wide at the base and are of good length, as from these cells the better queens are generally produced.

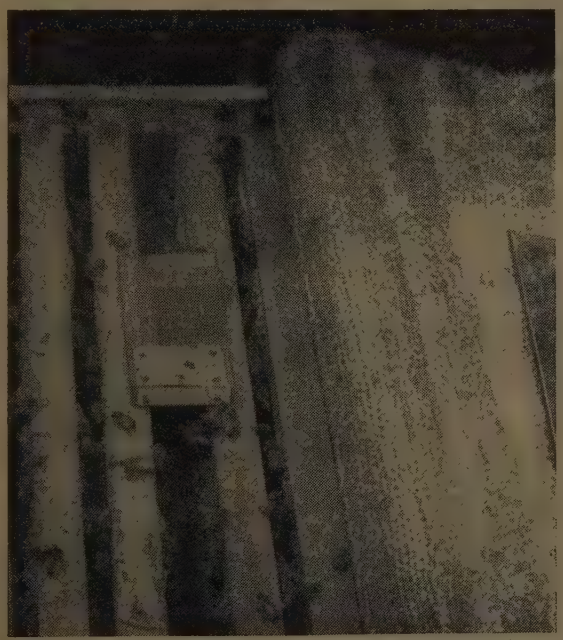
Introduction of Queen Cells

The introduction of a queen cell is very simple. First, the old queen and any queen cells that may have been started in the hive are removed; the new cell is then simply fastened with a piece of wire to a frame of brood near the top bar. The wire should be about 4in. long and bent in the middle to form a U very similar to a lady's hair pin. Both prongs of this pin are pushed through the piece of comb attached to the cell and then into the comb to hold the cell. The use of this pin will give a very firm and rigid fixing. The comb is then put back in the centre of the hive and the next comb to it spaced to leave just room for the cell to hang between without damaging it. In 2 days the young queen will have emerged from her cell, and with average weather conditions will mate and be laying in a further 6 to 8 days.

A cut-away comb with queen cells ready to transfer.

When all queens are mated and laying, the drones reared for mating can be excluded from the hive by the method described in the notes in the October "Journal".

A beekeeper without a desirable strain of bees in his apiary would be well advised to buy a queen or two from a commercial beekeeper. These queens should be tried for a season and if they are satisfactory, cells should be raised from them for further requeening of the apiary. Queens obtained from some commercial breeders are dispatched in mailing cages with full instructions for introduction attached to the cages and if these instructions are followed, the introductions should be successful. Brief instructions are given here for beekeepers receiving queens with no instructions.



A method of introducing a queen received through the post.

Remove the old queen and any queen cells that may have been started. Place the mailing cage, gauze or wire side down, on top of the combs after opening the combs so that most of the gauze is free to the bees. The ends of the cage must also be left free for the bees to eat away the cardboard covering and candy placed in the cage. Gnawing away of cardboard and eating of candy usually take 2 days.

On the third day gently lift the hive mat and inspect the cage to see if the queen is free. If she is, replace the mat and do not touch this hive for at least a week, when a very gentle and quick inspection should be made to see if the queen has been accepted. If eggs are present, the queen will be also. On no account should the hive be gone through to find her, as this will result in upsetting the bees and perhaps the killing of the queen.

If the queen is still in the cage and no attempt has been made to gnaw away the cardboard, make a quick but thorough inspection of all brood combs to see if any queen cells have been started. If any are found, make sure they are destroyed. Now close the hive down again, leaving the queen cage on the top of the frame. If no queen cells are found, the release of the queen from the cage can be hastened by removing the piece of cardboard and leaving the bees to eat away the candy.

Queen rearing is a fascinating beekeeping technique and is the only way that a beekeeper can expect to maintain the strain of his bees at a level where he can expect freedom from excessive swarming, a type of bee easy to handle, and maximum crops.

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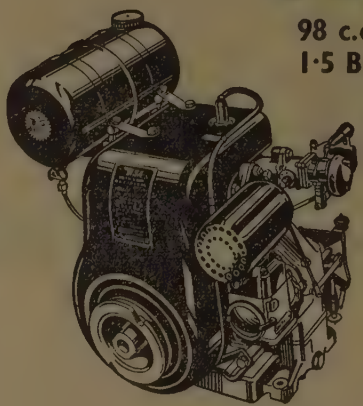

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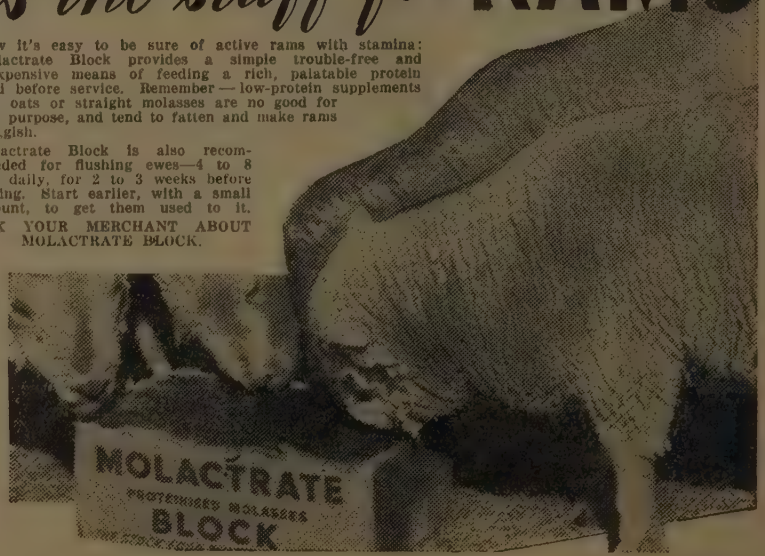

Wilt-resistant Greenfeast Peas

By D. E. YEN, Plant Breeder, Crop Research Division, Department of Scientific and Industrial Research, Otahuhu, and I. A. M. CRUICKSHANK, formerly Mycologist, Plant Diseases Division, Department of Scientific and Industrial Research, Auckland

PEA wilt (*Fusarium orthoceras* Appel. et Wollenw. var. *pisi* Linford) has been recorded in New Zealand by Cruickshank (1951) and has been recognised as a serious disease causing severe losses to pea growers (1). Many varieties of peas are known to be resistant (2), but growers in New Zealand have been unable to take advantage of these because the pea growing industry is founded on the export of certain required varieties which are susceptible to wilt. Thus even the more recent wilt-resistant varieties produced by American breeders have had limited use in New Zealand because there was no market for the seed. In addition, many resistant varieties are not well adapted to the varied conditions under which peas are grown in this country.

THE Greenfeast variety, exported to England as Lincoln, is one of the most widely grown for seed of the garden types and is the oldest of the varieties now used. Its persistence is due to its reliable yield under most New Zealand conditions and its popularity for export. It has also been used locally as the leading mid-season market and canning variety

Wilt-resistant Selection

The incorporation of wilt resistance into a susceptible variety without otherwise altering the variety is relatively simple with the use of what is termed the "backcross" method of breeding. A programme was begun to transfer resistance to Greenfeast in 1949. However, concurrent field tests of susceptible varieties yielded 97 plants from plots sown with seed described as Greenfeast which appeared to escape the disease. These were derived from a merchant's badly mixed line. Many of the 97 plants were immediately discarded, because they were not Greenfeast.

Seed was taken from the remaining plants and these were further tested for wilt resistance under glasshouse conditions and also in infected field plots. These tests demonstrated that the selections were indeed wilt resistant, and seed was further multiplied and retested, giving the same results.

While seed of the separate lines was being increased any which were different from typical Greenfeast in seed and pod type, flowering time, maturity, or any other characters were discarded. Five selections were increased for drill trial comparisons of yield with Greenfeast. Except for wilt resistance these five were identical with Greenfeast.

The following table summarises trial figures from replicated trials over 2 years at Lincoln. The plots were 2 chains long and 7 coulters wide.

YIELD OF SELECTED LINES OF WILT-RESISTANT GREENFEAST PEAS IN BUSHELS PER ACRE

Selection	Year		Mean yield over 2 years
	1953-54	1954-55	
1	43.5	40.0	41.8
2	42.0	33.0	37.5
3	41.0	34.0	37.5
4	44.0	43.0	43.5
5	40.0	37.0	37.8
Greenfeast	38.5	34.0	36.8
Least significant difference at 5 per cent. ..	4.0	6.0	

These figures show that even where no wilt is present in the soil the selections performed at least as well as Greenfeast.

A block trial of the same material at Darfield on a farmer's property cast some doubt on one of the selections, which was earlier than the other four lines and the Greenfeast control, so when the material was bulked this selection was excluded.

The material was also sent for testing to England, where wilt has recently been recorded (3), and a report of the disease tests showed that the selections were resistant to wilt there.

Green pea picking trials by the Vegetable Section of the Crop Research Division at Lincoln and Otahuhu have shown that all selections were as good as Greenfeast as a market garden variety.

Seed Release

Single plant selection to maintain purity and to produce what might be termed "nucleus" seed is to be continued by the Crop Research Division. The seed is then increased by the Extension Division, Department of Agriculture. Some seed has already been released to merchants, so that a limited area has been sown in the 1956-57 season, mainly in Canterbury. These peas are indistinguishable from ordinary Greenfeast and can be kept pure only by care in sowing and harvesting and in the seed store. Wilt-susceptible Greenfeast plants cannot be rogued from growing crops of the wilt-resistant strain.

The release of this line, provided it is kept free from susceptible Greenfeast, may have some beneficial effect on crop rotation in wilt-affected areas. The present recommendation of 11 to 15 years between crops of peas after severe wilt infection may in future be reduced to a more manageable period of 5 years. This latter precaution will be necessary owing to other pea diseases such as collar rot (*Ascochyta* and related species).

Wilt resistance is being transferred to the other main varieties of garden peas, William Massey and Onward, and the first releases should be made within 5 years. With these varieties the backcross method is being used, since no resistant plants could be found in commercial samples, and this has required a longer period to achieve resistant lines.

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2. M. B. Linford, "A Fusarium Wilt of Peas in Wisconsin", Wisconsin Agricultural Experimental Station Research Bulletin No. 85, 1928.
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Book Review

"Dairy Produce, 1956": Commonwealth Economic Committee

THIS review shows that the upward trend in world production and trade in dairy produce has continued, with a large part of the increase in Commonwealth countries. Both New Zealand and Australia enjoyed favourable seasons in 1955-56 and the increase in their exports of butter brought world trade in this commodity to the highest level since 1950, though it remained about one-fifth below the pre-war figure.

Most of the increase in Commonwealth exports of butter has been directed to the United Kingdom, where the lower average price levels of the past 2 years have encouraged an increase in butter consumption at the expense of margarine, though butter consumption remains well below the pre-war level and margarine consumption above it.

The Commonwealth has not shared in the general increase in world cheese production in recent years, Canadian output being well below the pre-war level and production in New Zealand and Australia being affected by a switch to butter and its by-products.

Obtainable from H.M. Stationery Office, or from the Secretary, Commonwealth Economic Committee, 2 Queen Anne's Gate Buildings, Dartmouth Street, London, SW1. Price 5s.

Poultry House "Sunporch"

By W. L. JOURDAIN,
Poultry Instructor, Department of Agriculture, Hamilton

VARIATIONS in types of houses provided for poultry and the fittings used are all designed for one of three reasons:—

1. Labour saving and, as a result, money saving.
2. Increased production and profit.
3. Comfort of the stock.

IN the Waikato and Bay of Plenty districts a new variation called the poultry house "sunporch" has been developed which is labour saving and provides for the comfort of the stock. This is a very popular variation and one which is easy to put in any established house or include in any new one with the exception of a round house. The sunporch is of most benefit in a multi-pen house and not so much in individual houses without divisions.

The more fresh air birds get the better, but in some localities where there is a lot of driving rain coming in the front of the house there are limitations. However, with this sunporch variation the problem is completely solved no matter what the climate, because the birds can be shut off from the sunporch portion when rain strikes the front.

A sunporch is made by an additional wire-netting wall being put along the front of the house about 4ft. to 6ft. from the front wall. Of course, when a new house is being built this can be included in the plan with very little extra cost, the addition being a foundation along the front of the house, 2 wire-netting doors, and a wire-netting wall for each pen or division involved.

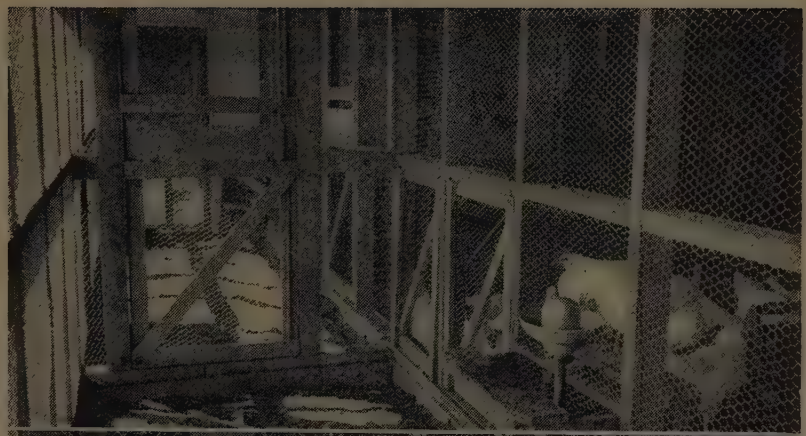
Whatever the extra cost it is well worth while and the labour and time saved in management more than covers it. The advantages of the extension can be seen readily from the illustrations. No matter what the climate, both the front of the house and the sunporch wall should be wire netting from floor to roof.

There are variations of the arrangements illustrated, but they do not make any vital difference to the working of the sunporch.

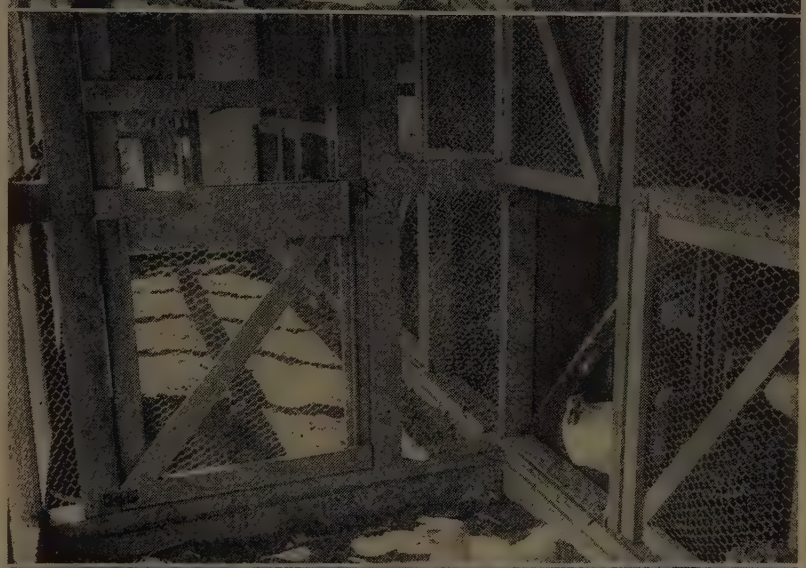
Looking right through the sunporches with all the connecting doors wide open. This makes an alleyway which facilitates the movement of stock. All that is required to shift birds from one end of the row of pens to the other is to shut all the other birds out of the sunporches and drive them straight through. The advantages are emphasised where a house is divided into a number of pens.

POULTRY HOUSE "SUNPORCH"

All the connecting doors and openings are closed. The various openings which are a distinct advantage in the management of the stock are shown. The two wire-netting frames beyond the water fountain, on the wire-netting partition on right of photograph, are hinged at the top and are normally kept open, as one is in the illustration immediately below, thus allowing the birds to make full use of the sunporch. This is a distinct advantage when people are walking through the sunporches; the birds can get away easily into the remainder of a pen and therefore do not get as frightened as they would if caught in an enclosed space.



There is an opening half-way up the door. This is for convenience when breeding birds are being culled or selected. Two of these openings can be seen in the doors in the illustration above. In the illustration below the opening can be closed with a hinged board. The hinges are on the bottom and make it much easier to operate the board than if it was hinged at the top.



View from the other end of the sunporch. The door from pen to sunporch is near a partition because it is much easier to drive birds through a door which is near a partition than through one which is right in the middle of a wall and it is so placed for convenience when the birds are being handled. The culling portholes in the partition door and the pen door are within easy reach of each other. It is obvious that culling operations are greatly simplified by this arrangement. The narrow sunporch makes the catching of birds extremely easy and does not frighten them overmuch.

South Island Pasture Seed Mixtures

By A. G. ELLIOTT,
Fields Superintendent, Department of Agriculture, Dunedin

THE remarkable variations in topographical, soil, and climatic conditions on arable and unploughable land sown in pasture preclude recommendations of a general nature for pasture seed mixtures in the South Island. Appreciation of the value of quality seed, which when sown under satisfactory conditions and maintained by efficient management practices gives maximum pasture production, is shown by the fact that seed sown is mainly of Certified strain.

THE soil and climatic conditions of certain areas of Marlborough, Canterbury, and Otago which enable grass and clover seed to be harvested satisfactorily have been factors responsible for the sowing in these regions of simple mixtures. These consist of 25lb. to 30lb. of perennial ryegrass with 3lb. of white clover per acre, or for shorter-term pastures 25lb. to 30lb. of short-rotation ryegrass with 4lb. to 5lb. of Montgomery red clover per acre. Seed is usually drilled in 7in. rows or sown with broadcast coulters and the resulting pasture, established with lime and phosphate as required, provides satisfactory production.

A ryegrass seed crop and some clover seed are harvested in the first and possibly the second season when the area is closed to stock at a time of maximum pasture growth. Clover seed crops are harvested in subsequent years. These simple mixtures supply seed for further sowings and a surplus for sale and also provide satisfactory grazing or hay for supplementary feed.

The sowing of seed mixtures of this type has undoubtedly proved to be a highly successful practice in these especially favoured districts and the income from seed production has enabled increased development of new and deteriorated lands requiring lime, phosphate, subdivision, housing, and buildings.

Mixtures in Higher-rainfall Districts

In the higher-rainfall districts seed mixtures for pastures intended mainly for grazing, hay, or silage contain 15lb. to 20lb. of perennial ryegrass, 10lb. of short-rotation ryegrass, 5lb. of cocksfoot, 3lb. of white clover, and 2lb. of Montgomery red clover per acre. The addition of crested dogstail (3lb.) and timothy (1lb. to 2lb.) depends on soil and rainfall conditions, but is common practice in certain districts. Comprehensive seed mixtures of this type result in useful, long-term pastures which under efficient management provide adequate feed for most of the growing season and hay or silage from surplus grazing areas.

Mixtures for Lower-fertility Areas

On the lower-fertility areas in parts of Marlborough and Canterbury the initial pasture seed mixture consists of 5lb. to 8lb. of cocksfoot, 3lb. to 5lb. of red clover, and 1lb. to 2lb. of white clover per acre. Under conditions favouring subterranean clover up to 3lb. per acre can replace red clover in the mixture. Increased interest is being shown in special-purpose grazing and hay pastures, particularly in the lighter-rainfall districts, where the sowing of 8lb. to 12lb. of lucerne with 2lb. to 4lb. of cocksfoot per acre, either in alternate drills or as a mixture, is giving satisfactory results.

With the necessity to reduce costs in production more attention is being given to sowing pastures other than by drilling in 7in. rows and here the use of specially designed coulters and the roller-seeder is reducing sowing rates and costs per acre as well as giving improved establishment.

Destruction of Rooks

FOR many years rooks have been very troublesome on cereal crops in the Christchurch area. Repeated attempts to eradicate them failed, but the outstanding success of a recent poisoning trial with sodium monofluoroacetate or 1080 is shown clearly by the illustration above. The hundreds of dead rooks were collected after bread sprayed with 1080 had been spread on a private road at the Paparua prison farm.

Preliminary experiments with 1080 and the poisoning trial were conducted by A. Forrester, Assistant to the Livestock Superintendent, and J. Gibson, Livestock Instructor, both of the Department of Agriculture, Christchurch.

It would appear from this experiment, in which the two rookeries at Paparua were virtually wiped out, that destruction of the pest is now possible. There are 20 rookeries, with an estimated total population of 14,000 birds, in Canterbury and 18 in the Hastings area.

The poison 1080 was introduced into New Zealand for eradication of rabbits. Because it is deadly poison and there is no antidote for it, use of this poison is closely controlled. It cannot be sold to members of the public.

Pampas Grass for Beef Cattle on Hill Country Farms

THOUGH pampas grass *(Cortaderia selloana)* was first suggested as a supplementary feed for cattle in New Zealand as early as 1876 (1), its main period of agricultural use in this country was from the early 1930s to the late 1940s. During the last few years the acreage of pampas grass has declined considerably and in 1954 a survey was made of all the pampas grass stands grown on hill country runs for the wintering of beef cattle. In this article D. I. Glue, Instructor in Agriculture, Department of Agriculture, Wellington, deals with the findings of this survey.

IN 1947 and 1948 officers of the Department of Agriculture stationed in every district in New Zealand made a survey of farmers' plantations of pampas grass. In an account of this survey (2) it was shown that dairy farmers, particularly in the more closely farmed districts of the North Island, were making extensive use of pampas grass for the wintering of dairy cows, thereby reducing the necessity for providing hay.

In 1951 a follow-up survey was made of the same properties and the results (3) showed that pampas grass had lost a good deal of ground in the intervening 4 years. Not only had the acreage declined, but many plantations were in poor condition and were showing obvious signs of deterioration. A number were pampas grass plantations only in name, supplying little or no grazing, and had been virtually abandoned.

Though these two surveys had covered few hill country farms, there appeared to be some evidence in both surveys that pampas grass was regarded favourably for the wintering of beef cattle on hill country runs. To test this belief instructors of the Department of Agriculture stationed in all districts throughout New Zealand carried out a further survey during the latter part of 1954 of all pampas grass grown on hill country farms for the grazing of run cattle.

Results of the 1954 Survey

Thirty-seven pampas grass plantations, with a total area of 137 acres, were listed throughout the country, most of the stands being less than 5 acres in area. The survey showed clearly that in most New Zealand hill country districts pampas grass was of little importance for grazing run cattle.

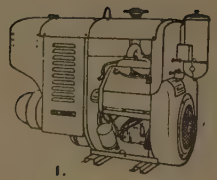
It was not used in the North Auckland Land District, and was little used in the Auckland Land District, except in Raglan County, where 13 stands were reported on. Even here, 10 of the farmers were only mildly enthusiastic about pampas grass and several considered that the areas would supply more valuable feed if they were sown down in high-producing pastures.

In the Gisborne Land District it was used to a limited extent in the Wairoa area. Six stands were reported on, but the instructor considered that only one stand was being properly managed and was of real value to the farm. He has since reported that pampas grass stands proved of great value when pastures were severely damaged by the recent invasion of army worms in this district.

In the Hawke's Bay Land District, where 7 stands were reported on, pampas grass was regarded as a valuable standby in times of shortage, such as a dry summer or a severe winter, provided management and utilisation were at a high level of efficiency.

In the Taranaki and Wellington Land Districts pampas grass was used by run cattle only to an extremely limited extent.

In the South Island pampas grass was practically unknown for grazing run cattle.



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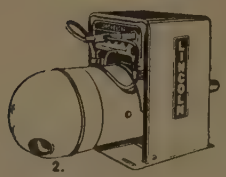

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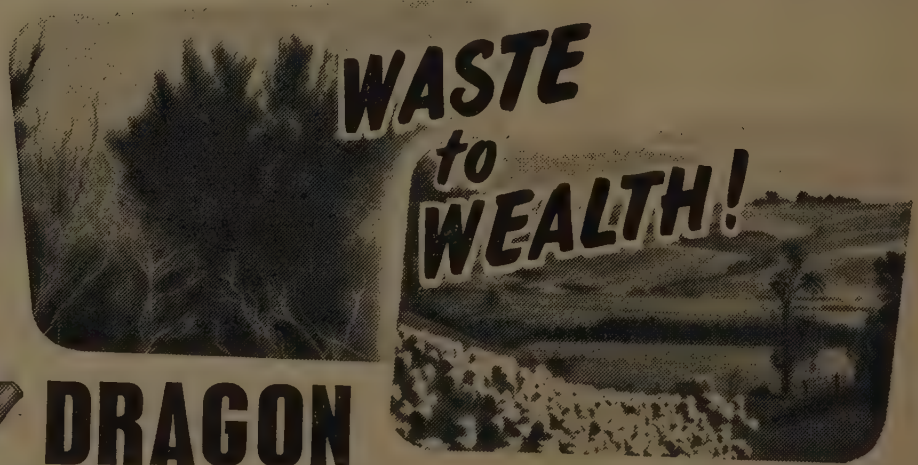

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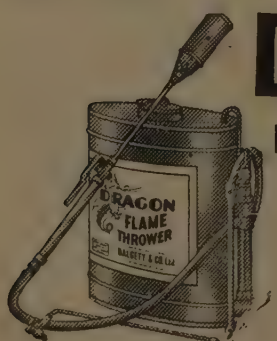

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Utilisation of Pampas Grass

The survey showed that generally the main use of pampas grass was to provide feed for run cattle in June, July, and August to supplement pasture grazing. Most farmers considered that pampas grass was not sufficient by itself, but must be supplemented by hay, silage, or some other class of supplementary feed. Some farmers grazed the pampas in conjunction with a pasture run-off, but others used it to counteract the watery nature of a crop of turnips or chou moellier.

In addition to its main use of carrying breeding cows, steers, and young stock through the winter, pampas grass was frequently regarded as an insurance against summer droughts. The value of the shelter which a good, dense stand supplies during rough weather was also frequently remarked on.

Thrift and Palatability of Stands

The thrift of stands ranged from poor to excellent, most being classed as very fair to good. It was noticeable that farmers who managed to graze the pampas grass hard down once or twice every year had a much higher opinion of its palatability than those who were unable to control the growth. This confirmed the results of feeding trials carried out at the Department of Agriculture's Ruakura Animal Research Station, where it was found that the nutritive value of the herbage declined rapidly as it became more mature, the fall in quality being sufficiently great to justify a recommendation that pampas grass stands be grazed down twice a year (4).

Farmers' and Instructors' Opinions

Though opinion varied from extremely adverse to enthusiastic, most farmers questioned were not in favour of pampas grass and many considered they would get more feed from the areas if they were in special-purpose or autumn-saved pastures. A number stated that stands were difficult to establish and control and there was general agreement that, if they were not controlled, stands quickly lost vigour and palatability.

The following were typical of the unfavourable comments expressed by farmers and instructors:—

Now that the hill country is being topdressed there is no longer any need for the winter feed supplied by pampas grass.

To make pampas grass grow well it is essential to plant it on the best land, where good pasture will produce more and better forage than pampas grass.

For over-wintering cattle swedes and hay are much superior to pampas grass, which has a limited use as a run-off for the swede crop.

Some favourable opinions were also expressed:—

Pampas grass allows a number of paddocks to be spelled during winter.

It saves considerable labour in feeding out hay.

Its greatest value is as shelter, particularly for sheep, when storms occur soon after early shearing.

It is also handy during a facial eczema scare.

It is of value not only during droughts but when the drought is over, as there is often no roughage left to winter the cattle.

Conclusions from the 1954 Survey

There seems to be little doubt that pampas grass has lost favour as a grazing proposition for hill country cattle in the last 6 years because of the following factors:—

1. With the advent of aerial topdressing and oversowing many hill country farmers have increased the productivity of their pastures to such a degree that they no longer need to rely on the pampas grass even to supply winter feed. It is interesting to recall that the previous surveys showed that pampas grass reached its greatest popularity during and immediately after the Second World War, when fertilisers were in short supply and pastures had deteriorated through reduced fertiliser applications.

2. In recent years a number of techniques have been evolved to supply grazing from pastures during winter. These include early autumn topdressing, the provision of autumn-saved pastures, the technique of laxer grazing in autumn (going into the cold weather with more growth cover), and more efficient rationing of winter feed by means of the electric fence.

3. Many hill country farms have paddocks that are of relatively easy topography and with recent advances in haymaking and silage-making machinery these paddocks have been harvested to supply winter feed.

4. In the last 5 years there has been a considerable increase in the acreage of crops, such as turnips and chou moellier, grown for winter feed on hill country.

It appears then that pampas grass is not making a major contribution to the wintering of run cattle in New Zealand and is regarded more as an insurance in times of emergency such as an exceptionally severe winter or a summer drought. It is, however, still playing a valuable part on some properties where cropping or haymaking is difficult or impossible.

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2. P. B. Lynch and W. L. Osborn, "Pampas Grass in New Zealand". N.Z. J. Agric., vol. 77, pp. 4-10. 1948.

3. S. H. Saxby, "Survey Shows Decline in Use of Pampas Grass". N.Z. J. Agric., vol. 85, p. 114. 1952.

4. A. A. Dunlop and M. R. Coup, "The Nutritive Value of Pampas Grass". N.Z. J. Sc. Tech., vol. 32(A), pp. 21-34. 1951.

Dairy Produce Graded for Export

SOME alterations to the whey butter and cheese portions of the return of dairy produce graded for export during November and for the 4 months ended November 1956 published in the January issue of "The Journal" have led to amended figures. These are given below:—

BUTTER

Period	Creamery (tons)	Whey (tons)	Total (tons)	Percentage Inc. or dec.
November 1956	24,315	422	24,737	—
November 1955	24,925	441	25,366	—
Increase or decrease	—610	—19	—629	—2.479
4 months ended 30/11/56	72,761	1,185	73,946	—
4 months ended 30/11/55	73,783	1,230	75,013	—
Increase or decrease	—1,022	—45	—1,067	—1.422

Butter in store at 30 November 1956 was 8,717 tons

CHEESE

Period	White (tons)	Coloured (tons)	Total (tons)	Percentage Inc. or dec.
November 1956	11,951	1,914	13,865	—
November 1955	12,307	2,097	14,404	—
Increase or decrease	—356	—183	—539	—3.742
4 months ended 30/11/56	29,733	4,012	33,745	—
4 months ended 30/11/55	29,990	4,131	34,121	—
Increase or decrease	—257	—119	—376	—1.102

Cheese in store at November 1956 was 16,806 tons

If these figures are converted into butterfat equivalent, there is a decrease of 1.368 per cent. in butterfat graded for the 4 months as compared with the corresponding period of the preceding season. The above figures refer only to butter and cheese graded for export, and owing to diversions which may take place from time to time they are not necessarily a true indication of production trends.

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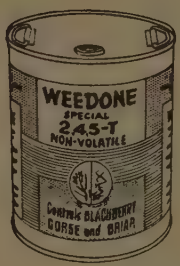

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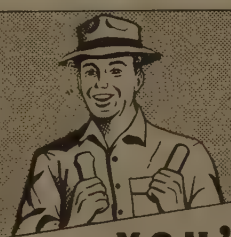

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Lambing Estimates for 1956 Season

The estimated number of lambs for the 1956 season and the estimated number of breeding ewes are the highest on record. The Dominion total of lambs is 25,383,700, an increase of 559,803 over the number for 1955, and that of breeding ewes is 26,923,200, an increase of 736,842 over the number for 1955.

The lambing percentage of 94.28 is a decrease of 0.52 on that for 1955. The North Island percentage of 89.16 is slightly above that of last year, but in several land districts facial eczema again appears to have had a marked effect on the percentage. In the South Island the percentage has not been unduly affected by the serious drought there last summer; it has dropped from 103.46 in 1955 to 100.37 in 1956.

Totals for counties, districts, and the Dominion are set out in the following tables, which have been contributed by the Animal Industry Division of the Department of Agriculture.

NORTH AUCKLAND LAND DISTRICT

County	Breeding ewes (as at 1956)	Estimated percentage of lambs	Estimated number of lambs
Mangonui	42,000	76.07	31,949
Whangaroa	16,400	75.26	12,343
Hokianga	45,700	81.16	37,090
Bay of Islands	97,600	86.45	84,375
Whangarei	113,300	84.63	95,886
Hobson	120,900	87.56	105,860
Otamatea	115,500	88.38	102,079
Rodney	143,000	83.27	119,076
Waitemata	112,000	87.33	97,810
Great Barrier Island	5,100	68.00	3,468
Manukau	97,500	80.00	78,000
Franklin	187,300	85.49	160,123
Totals	1,096,300	84.65	928,059

SOUTH AUCKLAND LAND DISTRICT

Raglan	583,900	85.63	499,994
Waikato	247,700	87.46	216,638
Waipa	232,100	91.79	213,045
Otorohanga	250,600	92.40	231,554
Waitomo	495,000	89.00	440,550
Taumarunui	398,800	88.02	351,024
Coromandel	37,400	77.94	29,150
Thames	15,500	84.34	13,073
Hauraki Plains	30,000	78.76	23,628
Ohinemuri	41,100	91.32	37,533
Piako	154,100	91.44	140,909
Matamata	388,600	88.84	345,232
Tauranga	198,700	90.98	180,777
Rotorua	240,900	91.61	220,688
Taupo	78,200	93.80	73,352
Whakatane	74,300	86.09	63,965
Totals	3,466,900	88.87	3,081,112

TARANAKI LAND DISTRICT

Clifton	105,000	86.88	91,224
Taranaki	38,800	95.18	36,930
Inglewood	73,400	92.42	67,836
Egmont	36,100	101.90	36,786
Stratford	210,500	89.33	188,040
Eltham	72,000	99.91	71,935
Waimate West	10,500	102.21	10,732
Hawera	91,300	91.10	83,174
Totals	637,600	92.01	586,657

HAWKE'S BAY LAND DISTRICT

County	Breeding ewes (as at 1956)	Estimated percentage of lambs	Estimated number of lambs
Wairoa	414,900	80.50	333,995
Hawke's Bay	1,059,200	92.25	977,112
Waipawa	497,300	96.75	481,138
Waipukurau	164,500	93.88	154,433
Patangata	566,700	86.34	489,289
Dannevirke	450,900	95.44	430,339
Woodville	111,400	89.80	100,037
Totals	3,264,900	90.86	2,966,343

GISBORNE LAND DISTRICT

Opotiki	58,300	76.87	44,815
Matakaoa	58,200	79.13	46,054
Waiapu	245,800	69.42	170,634
Uawa	109,500	79.39	86,932
Waikohu	355,000	86.16	305,868
Cook	448,200	82.20	368,420
Totals	1,275,000	80.21	1,022,723

WELLINGTON LAND DISTRICT

Patea	247,200	88.69	219,242
Waimarino	208,400	98.27	204,795
Waitotara	163,800	87.58	143,456
Wanganui	297,200	89.11	264,835
Rangitikei	1,054,400	93.86	989,660
Kiwitea	305,800	95.34	291,550
Pohangina	157,800	96.63	152,482
Oroua	268,000	96.14	257,655
Manawatu	163,600	97.44	159,412
Kairanga	116,700	92.29	107,702
Horowhenua	139,100	88.95	123,729
Hutt	71,700	86.34	61,906
Makara	50,300	80.39	40,436
Pahiatua	189,100	94.06	177,867
Akitio	162,000	82.11	133,018
Castlepoint	101,100	84.52	85,450
Eketahuna	161,300	91.30	147,267
Mauriceville	55,400	89.59	49,633
Masterton	340,200	88.02	299,444
Wairarapa South	199,200	84.14	167,607
Featherston	369,900	88.80	328,471
Chatham Islands	48,600	75.00	36,450
Totals	4,870,800	91.20	4,442,067

MARLBOROUGH LAND DISTRICT

Sounds	82,200	73.3	60,253
Marlborough	286,100	91.6	262,068
Awatere	192,900	91.8	177,082
Kaikoura	133,200	85.7	114,152
Totals	694,400	88.36	613,555

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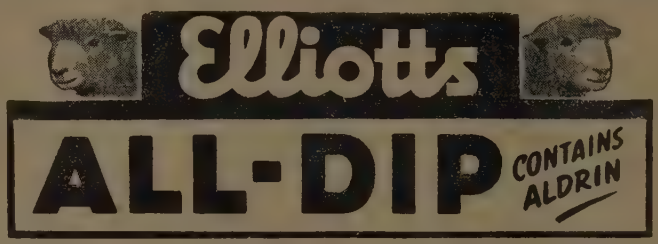

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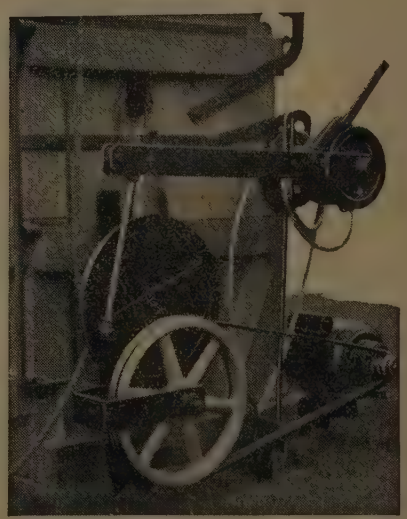

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NELSON LAND DISTRICT

County	Breeding ewes (as at 1956)	Estimated percentage of lambs	Estimated number of lambs
Waimea	187,100	90.5	169,326
Takaka	29,400	88.4	25,990
Collingwood	14,400	82.0	11,808
Buller	2,700	96.7	2,611
Murchison	33,100	78.6	26,017
Inangahua	23,800	102.6	24,419
Totals	290.500	89.56	260,171

WESTLAND LAND DISTRICT

Grey	39,900	102.4	40,858
Westland	46,700	105.2	49,128
Totals	86,600	103.91	89,986

CANTERBURY LAND DISTRICT

Amuri	257,500	84.4	217,330
Cheviot	167,100	93.6	156,406
Waipara	342,900	99.9	342,557
Kowhai	104,400	99.4	103,774
Ashley	73,300	91.9	67,363
Rangiora	65,700	107.1	70,365
Eyre	80,200	101.4	81,323
Oxford	108,000	100.7	108,756
Tawera	53,800	90.7	48,797
Malvern	212,500	103.4	219,725
Paparua	60,400	99.9	60,340
Waimairi	3,600	104.4	3,758
Heathcote	9,500	93.1	8,845
Halswell	18,800	94.1	17,691
Mount Herbert	35,900	96.0	34,464
Akaroa	83,700	99.6	83,365
Wairewa	70,000	97.5	68,250
Springs	43,900	102.6	45,041
Ellesmere	110,700	104.9	116,124
Selwyn	184,200	91.1	167,806
Ashburton	1,124,600	106.7	1,199,948
Geraldine	348,000	94.9	330,252
Levels	264,900	104.3	276,291
Mackenzie	325,800	84.5	275,301
Waimate	626,800	99.1	621,158
Totals	4,776,200	98.93	4,725,030

OTAGO LAND DISTRICT

Waitaki	544.600	98.7	537,520
Waihemo	124,400	102.0	126,888
Waikouaiti	91,400	89.5	81,803
Peninsula	22,000	101.0	22,220
Taieri	200,400	93.5	187,374
Bruce	318,500	104.25	332,036
Clutha	644,200	102.2	658,372
Tuapeka	461,400	98.0	452,172
Maniototo	265,100	100.0	265,100
Vincent	284,000	98.5	279,740
Lake	147,400	88.8	130,891
Totals	3,103,400	99.06	3,074,116

SOUTHLAND LAND DISTRICT

County	Breeding ewes (as at 1956)	Estimated percentage of lambs	Estimated number of lambs
Southland	2,525,000	108.8	2,747,200
Wallace	833,500	101.4	845,169
Stewart Island	2,100	72.0	1,512
Totals	3,360,600	106.94	3,593,881

DISTRICT ESTIMATES

North Auckland	1,096,300	84.65	928,059
South Auckland	3,466,900	88.87	3,081,112
Gisborne	1,275,000	80.21	1,022,723
Hawke's Bay	3,264,900	90.86	2,966,343
Taranaki	637,600	92.01	586,657
Wellington	4,870,800	91.20	4,442,067
Marlborough	694,400	88.36	613,555
Nelson	290,500	89.56	260,171
Westland	86,600	103.91	89,986
Canterbury	4,776,200	98.93	4,725,030
Otago	3,103,400	99.06	3,074,116
Southland	3,360,600	106.94	3,593,881
Totals	26,923,200	94.28	25,383,700

Dominion Totals

The following table shows the estimated lambing for the North and South Islands for the previous 5 years together with the number of lambs tailed.

Year	Number of breeding ewes	Estimated percentage of lambs	Estimated number of lambs	Number of lambs tailed
NORTH ISLAND				
1956	14,611,500	89.16	13,026,961	—
1955	14,103,936	87.38	12,323,682	—
1954	13,529,687	89.63	12,126,101	12,444,533
1953	13,097,679	96.24	12,605,517	12,836,745
1952	12,717,819	93.10	11,839,659	12,007,684
1951	12,620,097	91.75	11,579,023	11,876,012
SOUTH ISLAND				
1956	12,311,700	100.37	12,356,739	—
1955	12,082,422	103.46	12,500,215	—
1954	11,320,843	103.01	11,662,121	11,794,656
1953	10,683,697	98.52	10,526,302	10,758,060
1952	10,245,527	96.78	9,916,102	10,154,586
1951	10,018,394	97.59	9,777,423	9,938,012
DOMINION				
1956	26,923,200	94.28	25,383,700	—
1955	26,186,358	94.80	24,823,897	—
1954	24,850,530	95.73	23,788,222	24,239,189
1953	23,781,376	97.27	23,131,819	23,594,805
1952	22,963,346	94.74	21,755,761	22,162,270
1951	22,638,491	94.34	21,356,446	21,814,024

International Grassland Congress, Palmerston North, November 9, 1956.

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The Home Orchard in Autumn

[*National Publicity*

THE bright colours of ripening fruit are a gratifying sight after the effort and care spent during the season. Routine work is required for the harvest season as well as for the others. In this article S. P. Money, Horticultural Instructor, Department of Agriculture, Wellington, discusses orchard hygiene, the harvesting and storage of crops, use of cover crops, and other seasonal work.

ORCHARD hygiene is most important during autumn, when much fruit is near maturity. Diseases such as brown rot of peaches and plums or black spot of apples rapidly spoil a first-class crop.

Citrus

During February and March citrus trees should be inspected regularly for scale and other insect pests. As infection is not always confined to the fruit, careful examination of wood, foliage, and fruit is necessary. A sure indication that aphids or scale insects are present is the appearance of a black, sooty film on the foliage and fruit. To control all insect pests trees should be sprayed with summer oil, 1 pint to 4 gallons of water.

Passion Fruit

During autumn the fungous disease grease spot is prevalent on the leaves and fruit of passion fruit vines. It appears on the green and the purple fruit as greasy, brown, circular markings, which become more noticeable toward the end of autumn and early winter. This disease causes defoliation, dropping of fruits, and destruction of badly infected vines. The application of bordeaux mixture 3 : 4 : 50 (4oz. of bluestone and 5½oz. of hydrated lime to 4 gallons of water) at monthly intervals, especially between March and September, assists in checking this disease.

Sunscald should not be confused with a disease of passion fruit, as it is not a disease; the light-brown

[*Department of Scientific and Industrial Research.*

Circular black scale on fruit and foliage of New Zealand grapefruit.

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patches are usually caused by the fruit skin being exposed too long to the direct rays of the sun under still air conditions. This especially applies to fruit which has fallen to the ground.

Grapes

Grapes are approaching full maturity in mid-autumn, and protection should be given against birds, which attack grapes in most parts of New Zealand. If the individual bunches are not covered, as is done by some home orchardists to get good quality, fruit vines on a low trellis may be covered with fish netting. Another method is to put a length of ½in.-mesh wire netting along either side of the trellis, the two top edges being tied together through or over the trellis.

Botrytis rot, a fungous disease, attacks bunches of grapes late in the season. Infection usually follows injury to the fruit caused by birds and insects or splitting of the fruit during wet weather. The disease appears in the bunches as a felty mass of grey mould, which rots the fruit. Control by spraying has not proved very satisfactory. At the late stage at which botrytis makes an appearance spraying would leave an undesirable residue. Apart from this, the waxy bloom on the fruit makes effective spray coverage very difficult. Enclosing of the bunches in suitable bags is the most effective measure against botrytis. Thinning of the foliage to permit quicker drying of the bunches after rain reduces the incidence of botrytis, as does protection from bird and insect damage.

Strawberries

Strawberry beds for autumn planting should be prepared early in the season to allow the soil to settle before planting out is done. The area selected must be well drained or raised to allow free drainage, as wet conditions are conducive to poor growth and root rot diseases.

[*Department of Scientific and Industrial Research.*

Mealy bugs on lemon fruit.

[*Sparrow*

A cover crop of lupins in flower.

Strawberries are gross feeders and prefer a soil rich in humus. Before planting, a base dressing of manure consisting of plant foods which will become available over a fairly long period should be broadcast over the whole area and worked in with the final cultivation. This manure may consist of 3 parts by weight of blood and bone, 3 parts by weight of superphosphate, and 1 part by weight of sulphate of potash applied at 4oz. to 8oz. per square yard. During the growing season applications of manures should be sufficient to maintain growth and fruit size. These dressings should consist of elements which will be available fairly quickly to the plants. A mixture of 3 parts by weight of dried blood, 1 part by weight of sulphate of ammonia, 1 part by weight of superphosphate, and 1 part by weight of sulphate of potash should be applied at 1oz. to 2oz. per square yard. The first application should be made when the first blossoms appear and further applications where it appears necessary. The manure mixture may burn if it comes in contact with the leaves.

Spraying with bordeaux mixture 3 : 4 : 50 (4oz. of bluestone and 5½oz. of hydrated lime to 4 gallons of water) to control leaf spot of strawberries, currants, raspberries, and other brambles should be continued during autumn.

Cover Crops

In most districts cover crops can be sown successfully in autumn. There are many advantages in growing cover crops. Root systems of such crops, especially those of the grain types, are very effective for improving the structure of the soil. When the crop is later turned in it contributes valuable humus material to the soil.

One of the most important features of growing a cover crop is to allow enough time for the crop to mature and if possible to become fibrous before it is turned in. If it is a crop which does not dry out easily, it is important that it be left until it has "hardened" and the sappy nature of the new growth is past. The reason for this is that soft, sappy growth, before fibre has developed, is of little use to improve the soil when dug in. It has a high water content and is broken down by soil bacteria very quickly, so that spring rains can easily leach much of it out of the soil before the trees and plants can derive benefit from it.

A crop which has been allowed to dry out or mature is much more useful. When this material is turned in the lasting mechanical effects of accumulating material aerate the soil through succeeding wet winters and provide moisture-retaining qualities during following summers, as it is more difficult for the soil bacteria to break down the hard plant material.

Kinds of Cover Crops

The three main types of cover crops are legumes, cereals, and brassicas.

Legumes

Legumes are generally preferable to other crops, as, beside the desirable qualities for a cover crop mentioned above, they are able to provide nitrogen through their ability to fix free nitrogen from the air in their root nodules. This nitrogen is released as the plant decomposes in the soil. Lupin is the most popular of this group, being very widely grown

throughout the country. One disadvantage is that lupin is a slow-growing crop which takes at least 20 weeks to reach a suitable stage for digging in. The young plants are very frost tender and must be sown early enough to allow them to become established before severe frosts occur. Successive crops of lupins should not be grown every year, as the plant is susceptible to a number of diseases, notably *Sclerotinia sclerotiorum*. Continued cropping could allow a build up of this fungous disease, which also attacks garden crops such as tomatoes and lettuce. Other legumes used as cover crops are field peas and occasionally red clover.

Cereals

Cereals are important for use as cover crops. Those most commonly grown are barley (Black Skinless and Cape varieties), Algerian oats, and ryecorn. The last-named is very widely grown as a cover crop in the tobacco areas of the Nelson Province. All are easy to establish and capable of producing a quick-growing bulk of green material. Oats and ryecorn particularly can be grown on a wide range of soils and under cool conditions.

Brassicas

Brassicas are not nearly as important as legumes and cereals. The only brassica which is quite suitable for an orchard cover crop is mustard. It has the advantage of making quick growth and is ready for turning in before other crops, but the growth made is soft and sappy and decomposes very rapidly.

No one type of cover crop should be grown continuously, as this can be responsible for increasing soil-borne diseases. One plan is to grow lupins for 1 year and two different types of cereal for the following 2 years. Some people grow a mixture of field peas and oats. The oats help to support the peas. This combination can be followed by a crop of ryecorn or some other cereal. Lupins and cereals can also be used in combination.

Sowing

To be of the most benefit the crop should be sown at a time when its competition is least felt by the trees. The best period as far as the trees are concerned is after the fruit crop has been harvested, usually in late February to early March, but this is not practicable among mid- and late-season varieties of fruit. In dry autumns it may be desirable to delay sowing until after rain.

On most soils phosphate is the most important fertiliser for cover crops. For cereals the addition of a small amount of nitrogenous fertiliser such as blood and bone or dried blood may be desirable. Superphosphate at 1oz. per square yard is sufficient for legumes, and ½oz. of dried blood should be added for cereal crops.

Recommended sowing rates for seed of cover crops are:—

	oz. per sq. yds.
Blue lupin	1-2 3
Barley	1-2 6
Oats	1-2 6
Ryecorn	1-2 6
Mustard	1-2 60

The crop should be left to harden as much as possible before it is turned in, and a light dressing of blood and bone applied then will overcome the temporary shortage of nitrogen while the bacterial action is taking place.

Harvesting and Storage of Fruit

Apples and pears required for storage should not be harvested until they are fully mature. If young and old trees are growing together, it is best to use fruit from young trees first, as usually this does not store as well as fruit from older trees.

Apples and pears are mature when the seeds are brown or black but the flesh is still crisp and firm. Fruit tends to mature first on the higher and more exposed parts of the trees; thus it may be necessary to make several pickings for fruit of even maturity.

Before it is stored the fruit should be sorted into large, medium, and small sizes, as the smaller fruit usually has the best keeping qualities. Any diseased, bruised, or damaged fruit should be discarded.

Shallow trays placed in racks in a cool, dry position are the best for storing fruit, for in trays fruit can be inspected without being handled and the risk of bruising is reduced. If fruit cases are used, they should be lined with several layers of newspaper or a layer of corrugated cardboard. The cases should then be stacked so that air can circulate freely around them.

Cape gooseberries ripen in autumn and should be harvested when the husks change from green to a light straw colour. The berry at this stage also changes to a bright yellow. The berries do not ripen all at once and frequent pickings are necessary for reasonably uniform maturity.

Fruit Crop Estimates for 1956-57 Season

THE following estimates made in December of the fruit crop for the 1956-57 season are in 000's of bushel cases. They are summarised from information supplied by field officers of the Horticulture Division of the Department of Agriculture. Districts producing less than 500 bushels of a variety are not shown, but are included in totals. District totals of more than 500 are rounded to the nearest 1000.

FRUIT	DISTRICT								
	Auckland Province except Gisborne	Gisborne	Hawke's Bay	Wellington and Taranaki Provinces	Nelson Province	Marlborough	Canterbury and North Otago	Central Otago	Total 000 bushels
APPLES									
Ballarat	62	5	86	3	9	8	7	1	181
Cox's Orange Pippin ..	7	1	70	8	138	12	10	12	253
Delicious	31	4	90	4	216	29	17	57	448
Dougherty	17	2	69	—	33	2	—	—	123
Granny Smith ..	101	4	125	5	102	3	3	5	348
Gravenstein	23	—	36	—	90	2	1	2	154
Jonathan	9	—	45	2	274	29	18	20	397
Sturmer	11	8	220	13	404	36	37	37	786
Others	90	3	169	8	184	18	50	39	561
Total	351	27	910	38	1,450	139	163	173	3,251
PEARS—									
Beurre Bosc	1	—	2	—	11	—	—	—	14
Louise Bonne de Jersey	1	—	19	—	—	—	—	1	21
Packham's Triumph ..	9	—	8	—	9	—	—	—	26
P. Barry	2	1	15	1	6	—	2	—	27
W. B. Chretien	9	1	70	—	55	—	4	13	152
Winter Cole	1	1	56	2	51	1	7	7	126
Winter Nelis	—	1	33	1	10	1	1	12	59
Others	12	—	5	1	12	1	9	5	45
Total	35	4	208	5	154	3	23	38	470
OTHER FRUITS—									
Peaches	81	12	315	3	55	8	9	111	594
Apricots	—	1	6	—	—	—	22	157	186
Nectarines	2	1	13	—	2	1	3	28	50
Plums	45	3	77	1	10	2	16	36	190
Cherries	—	—	1	—	1	3	2	10	17
Quinces	9	—	5	—	3	—	1	1	19

Soils for Greens Renovation

By E. H. ARNOLD,
Assistant Fields Superintendent, Department of Agriculture, Auckland

AFTER a season of constant use playing areas normally show signs of wear varying according to the original condition of the playing area, weather during the season, and the type of sport. Generally, in sports such as cricket, tennis, and bowls excessive wear takes place at or near the ends, and in other games like golf and croquet the greatest wear is around the holes and hoops.

MUCH of this wear results not only in breaks in the turf cover, but in a disturbance of soil levels, with the result that further soil must be introduced to restore the levels before the renovated areas are reseeded.

Also it sometimes becomes necessary or desirable to use some soil just before the opening of playing seasons, especially where the turf is somewhat open and heavy winter rains have caused some surface pitting. In such areas a light dressing of dry soil or a liquid application of soil, known as a "mud bath," can do much to restore the uniformity of the surface if the application is made a few weeks before the areas are required for play.

Suitable Soil Types

Generally, the best soils for renovation are those loams tending toward clay loam conditions. Such soils are often those of second-class browntop areas, where the humus content is fairly low.

Sandy soils and peaty soils should be avoided. The former are too abrasive under play, and once the grass has been worn off they are easily disturbed and become windblown or pitted by bird baths. Peaty soils are similarly unsatisfactory, as they do not consolidate and are subject to excessive wear. At the other extreme of soil types heavy clays and silts possess the disadvantage of packing down too tightly, with the result that under rolling a concrete-like surface is developed. After reseeding and before rolling is necessary rain may set the surface, hindering seedlings breaking through.

Where there is difficulty in obtaining a soil of the right type it is better to blend two soils of relatively opposite types than to use either alone. Again, though clay loams are regarded as best for average conditions, they are more suited to bowling greens and tennis courts, where a firm running surface is desired, than they are to golf putting greens, where greater resilience is needed. For the latter a lighter soil of a peaty loam type might even be quite satisfactory.

Application of Soils

Soils to be fully effective must be worked into the topsoil of the playing greens. For this the areas must be grooved to a depth of ½in. at 1in. intervals before the application of soil. The soil must then be well rubbed in to knit with the original soil and penetrate any fibrous layers that might be building up under acid conditions. In some instances so that more soil might be introduced it might be desirable to core the greens before the soil is applied. This would be advisable particularly where the soil of the greens was too light or too heavy and it was desired to effect some change over several years of treatment.

Application of soil without prior grooving or coring will lead ultimately to successive strata of soil and fibre mat being built up. Under very dry conditions this can affect moisture rise with the result that turf plants may die.

When a liquid soil dressing or mud bath is being applied it is not essential to groove or core if this has already been done in the main annual renovation. The purpose of these applications is merely to true up the playing greens, and consequently this is effected with the minimum quantity of soil.

Soil Fertility

The fertility level of the introduced soil is not of major importance. Rather should one be concerned with its physical condition and ensure that it contains the right fraction of clay for the purpose.

It is possible that a soil complying with this condition may contain too much humus in the top few inches. If this is so, the top part should be discarded and the soil just below it used, provided that its other qualities are satisfactory. Any loss in fertility incurred by using the subsoil can quite rapidly be rectified by manurial treatment.

Preparation of Soil

A greenkeeper should not leave the provision of soil until the last minute, but should get it in some months before it is required, have it screened as opportunity offers, and see that it is adequately protected from the weather.

Nearly all soil will contain some weed, clover, or grass seed. To reduce this to a minimum it is advisable to turn the soil from time to time to bring seed near the surface, where it will germinate. Even an occasional light sprinkling to induce such germination when the soil is too dry will be found to be helpful.

Finally, it must be emphasised that too much care cannot be given to the choice and preparation of soil for greens renovation. Many failures can be blamed on two factors—poor soil types and lack of early provision to enable the soil to be put in the best possible condition.

Agricultural and Pastoral Show Dates

THE following are dates and venues of A. and P. shows from mid-February to the end of April.

NORTH ISLAND

February

15 and 16 February—Ohura A., P., H., and I. at Nihoniho.
*15 and 16 February—Masterton A. and P. at Masterton.
16 February—Tauranga A. and P. at Tauranga.
16 February—Northern Wairoa A. and P. at Arapohue.
16 February—Waiapu P. and I. at Ruatoria.
16 and 17 February—Franklin A. and P. at Pukekohe.
19 February — Otorohanga A. and P. at Otorohanga.
21 February—Matamata A. and P. at Matamata.
22 and 23 February—Te Kuiti and District A. and P. at Te Kuiti.
22 and 23 February — Wellington and Hutt Valley A. and P. at Trentham.
23 February—Putaruru District A. and P. at Putaruru.
*23 February—Te Puke A. and P. at Te Puke (50th Jubilee).

March

2 March—Mangonui County A. and P. at Kaitaia.
2 March—Waikato Central A. and P. at Cambridge.
2 March—Waiotira Junction A. and P. at Waiotira.
2 March—Whakatane A. and P. at Whakatane.
6 March—Morrinsville A. and P. at Morrinsville.
*9 March—Opotiki A. and P. at Opotiki.
9 March—Kumeu District A. and P. at Kumeu.
15 March—Wellsford A. and P. at Wellsford.
16 March—Hawke's Bay A. and P. at Hastings.

SOUTH ISLAND

February

16 February—Murchison A. and P. at Murchison.
*22 and 23 February—Buller A. and P. at Westport.
23 February—Maniototo A. and P. at Ranfurly.
23 February—Kaikoura A. and P. at Kaikoura.

March

2 March—Temuka and Geraldine A. and P. at Winchester.
9 March—Cheviot A. and P. at Cheviot.
9 March—Mt. Benger A. and P. at Roxburgh.
16 March—Upper Clutha A. and P. at Wanaka.
16 March—Hawarden A. and P. at Hawarden.
*16 March—Mayfield A. and P. at Mayfield.
30 March—Methven A. and P. at Methven.

April

6 April—Oxford A. and P. at Oxford.
13 April—Malvern A. and P. at Sheffield.
22 April—Strath Taieri A. and P. at Middlemarch.
*22 April — Mackenzie Highland Show at Fairlie.

* The Department of Agriculture exhibit will be staged at this show.

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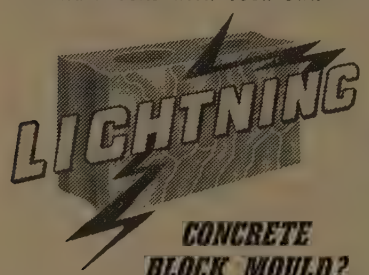

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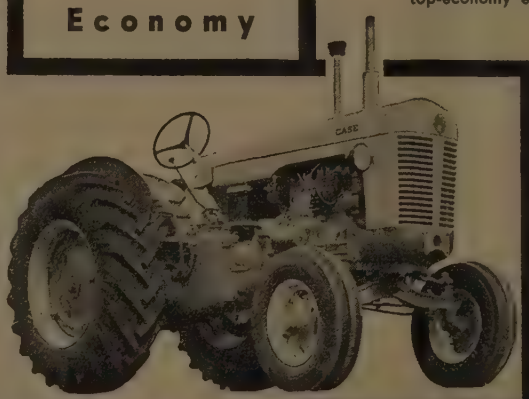

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Beekeeping on West Coast of South Island

By D. W. A. SEAL,

Apiary Instructor, Department of Agriculture, Invercargill

BEEKEEPING conditions on the west coast of the South Island are such that large-scale feeding of colonies, as practised in other parts of New Zealand in early spring, is rarely necessary, and though extremely wet weather prevents any beekeeping activity at times, the long season during which many bush nectar sources are available, even in the poorest season, ensures a crop of honey that will at least cover expenses.

APART from small areas of pastured river flats and areas known as "pakahi" land the district is mostly hilly to mountainous bush-clad country in which rata provides the main source of nectar for surplus crops of honey.

In the early part of the season there is usually a variety and profusion of bush flora which provide an abundance of nectar suitable for early spring build-up of the hives; also, before the main honey flow begins, honey dew is available in some areas from black birch, which greatly assists the bees during early brood rearing.

Kamahi is the next to bloom; it is followed by rata, on which beekeepers depend for the main crop of honey.

Unfortunately the flavour of kamahi honey is very strong and it is not suitable for blending unless it is mixed with large quantities of mild-flavoured honey.

Kamahi usually secretes nectar in abundance, and if the strength of colonies is allowed to develop early in the season, bees will store a large surplus from this source, which tends to reduce the quantity stored later from rata.

This is largely overcome by beekeepers who practise a system of hive management which retards early colony development and allows the main build-up to take place over the kamahi nectar flow period in readiness for the main crop to be gathered from rata and less prolific but important sources of nectar such as blackberry, which grows in profusion on waste lands.

When rata is in bloom every effort should be made by the beekeeper to see that the bees have sufficient comb room for storage. In a good rata season where this work has not been attended to on time the bees have been known to build their combs on the outside of the hive under overhanging covers and also under high floor boards so great was the quantity of nectar gathered from that source when conditions were favourable. Prolonged rainfall is the greatest drawback to beekeeping on the coast, where it has been known to rain continuously for several weeks. A rainfall of 100in. per annum is common in some areas.

It would be impossible to set down a standard of apiary management for the coast as a whole, as even within the district there are variations from one place to another. It can really be divided into six different districts, each with its own characteristics, such as weather and nectar-producing blooming periods.

Karamea-Westport

In the northern part of the area (Karamea-Westport) commercial beekeeping is not practised much and in the main beekeeping is on a domestic scale. The main reason is that large areas of "pakahi" land which have been cleared of bush now lie barren, growing little more than stunted rushes and providing no source of nectar. Small, pastured areas and distant bush are the only available

HEADING PHOTOGRAPHS: Well-kept apiaries in bush areas in Westland.

sources and as the rata tree blooms in profusion in about 3-yearly periods, very little nectar is gathered during an off-season.

Barrytown Area

Farther south in the Barrytown area conditions are much better. Here the season is one of the earliest, but as the district is only a narrow strip between sea and hills, foraging bees must travel rather long distances. The crop from this area, though small, is usually of fair quality and also provides early stores which can be used to advantage by apiarists who have colonies in the higher areas where the season begins much later.

Usually queen bees start laying about the middle of August and normally the hives require spring cleaning and colony adjustment early in October. Queen supersedure can be expected any time from the middle of September onward. Gathering of crops can be completed by December or early January, as in most seasons all bush flora has then finished blooming. Unlike other areas, a little rata blooms each year in addition to the usual triennial blooming and yields sufficient rata nectar, which, blended with a little kamahi, provides a honey of average flavour.

Ikamatua

Over the hills from Barrytown is Ikamatua, another slightly different area. Here nectar sources are mixed, being from both bush and pasture land. Queen raising can be carried out with success, as the weather is more stable and this area has an abundance of honey dew early in the season suitable for feeding to bees. Queen bees reared in September can provide sufficient bees to gather a full crop the first season, but as colonies progress so rapidly considerable trouble is experienced retarding their progress o avoid excessive storage of honey dew and kamahi.

Swarming is prevalent and a constant watch is necessary to avoid loss of swarms which can be overcome by splitting up of colonies, but this method has its limits. Two queen colonies can be worked with favourable results. As in all west coast districts a surplus of bees is among the main worries of the beekeeper early in the season.

Greymouth District

In the vicinity of Greymouth very little beekeeping is practised, mainly owing to lack of suitable bush areas. The existing bush is mainly kamahi with the remaining hills clad only with poor pasture, gorse, and broom.

Otira Gorge

Farther east in the Otira Gorge area rata blooms in profusion in good years and excellent crops are obtained from the ranges on each side, which are studded with crimson bloom up to the snowline.

Here again kamahi is prevalent earlier in the season. Drawbacks, however, are a dearth of pollen in some seasons and also heavy rainfall and high winds which cause much damage to colonies.

Harihari-Whataroa

Farther south at Harihari and Whataroa is another slightly different area with high mountainous country in the east and flat pasture lands to the west. Crops of mixed sources are normally gathered with an abundance of rata in good years. Sufficient honey from manuka and flax is produced to darken crops in occasional years.

Franz Josef

High rainfalls occur in this area, as they do farther south at Franz Josef, where colonies can be brought to their peak as soon as possible with safety. It is yet to be determined whether the kamahi in this area produces a better grade of nectar or whether sources of nectar available are sufficiently mixed to blend out its strong flavour, or whether high rainfall prevents bees gathering an excess of any particular nectar. Honey dew does not exist and crops normally are of good average grade.

Generally, the season starts on the lower levels about mid-August and about mid-October in higher and more southern districts. Apiarists can be successful only by studying the bush flora and activity of the bees under local conditions. Weather must be taken into account and every fine day used to advantage. Fortunately a large percentage of the rainfall is at night, but prolonged cloudy weather with showers prevails for several weeks in some areas.

Where honey dew and kamahi are troublesome an endeavour to requeen with the aid of nuclei should be made annually. The making up of nuclei in September or October reduces the strength of existing colonies to advantage and if division boards are used, the hives can remain in this condition until about the end of November. They can then be united by the newspaper method (described on page 383 of the October issue of "The Journal") to be at their peak should a rata flow begin.

When colonies are held back, however, the brood nests may become clogged with honey. An abundant supply of foundation is therefore an advantage in spring. Surplus kamahi or honey dew may be put aside to be used later for stores. Rata honey is definitely unsuitable for winter stores owing to rapid granulation in the combs. Many a beekeeper has found his honey a solid mass after less than a week in the tank after extraction.

Any person who contemplates taking up beekeeping on the west coast of the South Island should first consult the local Apiary Instructor regarding local conditions and available nectar sources.

Meteorological Records for December

Station	Height of station above M.S.L. (ft.)	Air temperatures in degrees (Fahrenheit)				Rainfall in inches					Bright sunshine hours
		Approx. mean	Difference from normal	Absolute maximum and minimum		Total fall	No. of days of rain	Difference from normal	Maximum fall		
				Maximum	Minimum				Amount	Date	
Kerikeri	201	64.0	+ 1.3	82.4	44.5	4.61	14	+ 0.76	2.09	26	257
Auckland	160	64.5	+ 0.8	77.2	50.3	4.43	15	+ 1.50	0.83	15	265
Tauranga	10	62.5	+ 0.4	82.1	42.8	4.92	16	+ 1.39	1.05	16	248
Ruakura	131	61.0	+ 0.3	77.8	39.1	4.58	17	+ 1.50	0.81	11	228
Rotorua	975	61.2	+ 1.2	83.5	38.2	6.14	14	+ 2.16	2.75	17	220
Gisborne	12	63.7	+ 1.0	83.8	41.9	4.22	14	+ 2.31	2.45	17	239
New Plymouth ..	160	60.2	+ 0.2	72.5	44.3	4.52	13	— 0.07	0.83	15	220
Karioi	2125	56.5	+ 1.3	77.2	33.8	6.32	15	+ 2.41	1.62	12	
Napier	5	64.6	+ 1.4	83.2	42.8	4.48	13	+ 2.50	1.39	17	229
Wanganui	72	61.0	— 0.4	77.2	45.2	5.62	11	+ 2.76	2.26	12	241
Palmerston North ..	110	60.8	+ 0.4	76.9	42.0	7.57	14	+ 4.29	2.14	12	193
Waingawa	340	60.4	+ 0.2	79.0	36.3	4.23	12	+ 1.72	1.96	12	207
Wellington	415	60.5	+ 1.5	71.4	45.0	2.69	12	— 0.77	0.86	2	212
Nelson airfield ..	5	60.0	+ 0.6	76.2	41.7	3.19	10	+ 0.35	1.01	16	215
Blenheim	12	62.2	+ 1.4	83.8	41.9	1.98	12	— 0.02	0.54	16	232
Hokitika	15	57.6	+ 1.5	69.6	41.9	8.23	19	— 1.73	1.08	25	182
Hanmer	1270	57.7	— 0.1	82.0	36.0	2.97	14	— 0.74	0.78	12	188
Christchurch ..	22	60.6	+ 0.8	84.2	42.2	2.81	11	+ 0.27	0.70	1	201
Ashburton	323	60.4	+ 1.3	85.2	39.2	2.33	9	— 0.68	0.97	12	178
Timaru	56	59.6	+ 0.9	85.8	39.7	2.04	10	— 0.62	0.49	12	167
Alexandra	520	60.6	+ 0.4	84.2	37.3	2.22	12	+ 0.92	0.71	25	183
Taieri	80	57.6	+ 1.6	79.2	39.0	3.80	15	+ 1.24	0.69	27	151
Invercargill airfield ..	0	56.8	+ 1.8	76.8	39.2	4.35	16	+ 0.75	1.01	25	160
Chatham Islands ..	140	57.0	+ 2.0	67.0	44.8	4.74	18	+ 2.45	1.31	2	

Renovation of Run-out Browntop Hill Country

By N. A. CULLEN,
Research Officer, Department of Agriculture Invermay Research Station

FARMERS contemplating the improvement of browntop country are faced with deciding whether to plough and regrass or to attempt improvement by oversowing and topdressing. Until recently rejuvenation by the latter method was usually considered impracticable and uneconomic, if not worthless. Indeed those enterprising enough to attempt this method usually found the results seldom warranted the cost of heavy dressings of lime and fertiliser.

HOWEVER, ideas have changed in recent years largely as a result of two factors:—

1. The discovery of the value of molybdenum in reducing the need for heavy liming on many soil types.

2. The introduction of aerial topdressing, making the topdressing of hill country a quick, simple, and labour-saving operation.

Oversowing and topdressing have thus become both practicable and economic, results in many instances being comparable with those from ploughing and regrassing.

Details of Trial

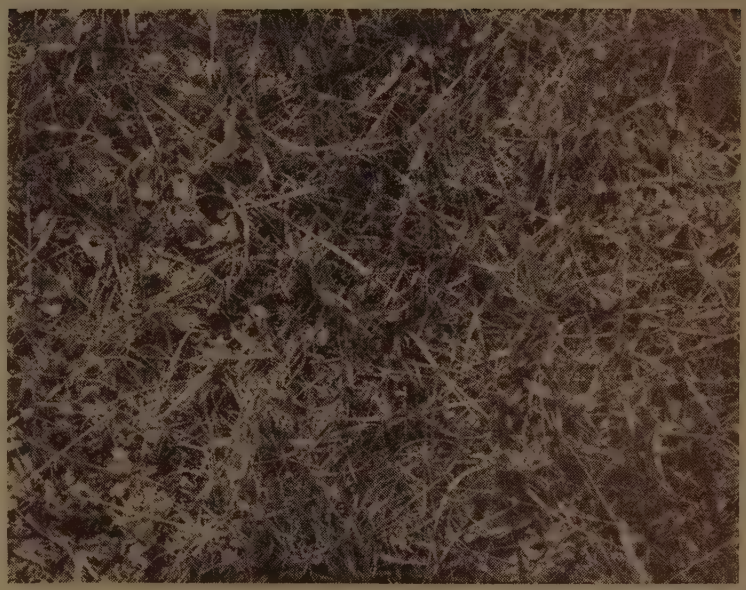
In 1953 a trial was begun at the Department of Agriculture's Invermay Research Station to investigate costs of and results from oversowing and topdressing compared with those for ploughing and regrassing.

An old run-out browntop pasture, considered typical of this class of country, was chosen. It had been sown about 10 years previously and had received no lime or fertiliser in that time. The sward was almost pure browntop, moss, and flatweeds. A few sickly crested dogstail and clover plants were surviving, but no ryegrass could be found.

The area was subdivided into three 1-acre paddocks which then received the following treatments:—

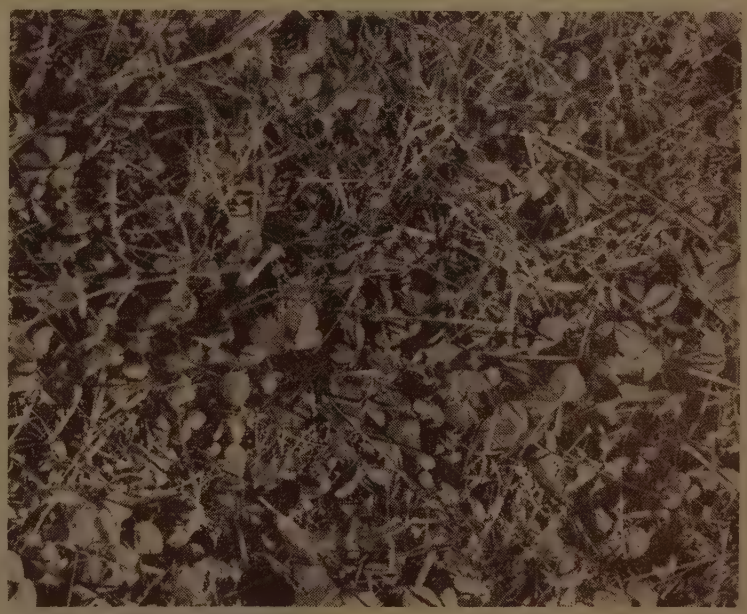
Paddock 1 was ploughed in July 1953, received lime at 30cwt. per acre, and was sown to new pasture in December 1953 with 290lb. of superphosphate per acre. A typical seed mixture consisting of 10lb. of short-rotation ryegrass, 15lb. of perennial ryegrass, 4lb. of cocksfoot, 4lb. of timothy, 3lb. of Montgomery red clover, and 3lb. of New Zealand white clover per acre was sown. A further 200lb. of molybdenum superphosphate was applied during April 1954.

Paddock 2 was oversown with 3lb. of New Zealand white clover and 3lb. of Montgomery red clover per acre



▲ Old pasture, not treated, consisting of sweet vernal, browntop, moss, and flatweeds.

▼ Pasture resulting from oversowing with clover seed, superphosphate, and molybdenum.



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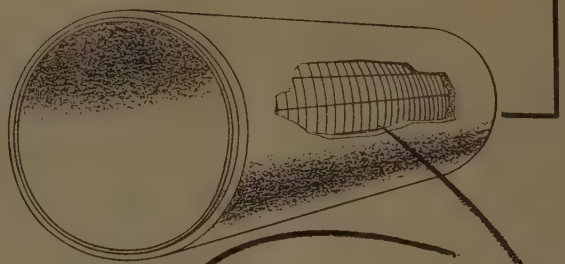

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and topdressed with 30cwt. of lime, 2cwt. of superphosphate, and 2½oz. of sodium molybdate per acre in September 1953. A further 200lb. of superphosphate per acre was applied in April 1954.

Paddocks 1 and 2 were again topdressed with 2cwt. of superphosphate per acre in February 1955 and with 3cwt. of superphosphate per acre in March 1956.

Paddock 3 was control and was left in its natural state.

Results

The results from oversowing and topdressing were spectacular. Within a few weeks improvement was visible and by the end of the 1953-54 season the proportion of clover had risen to over 30 per cent. (The clover content of the control paddock was only about 5 per cent.) The sward had lost its dry, sodbound condition, and some of the better grass species—ryegrass and cocksfoot—were beginning to appear.

In the new grass paddock good establishment was obtained and there was no trouble from the old browntop, indicating that direct regrassing is practicable on this class of country provided adequate fertiliser is applied.

The second season's results continued to be outstanding. In the oversown plots clover growth was extremely good, the plants appearing vigorous and healthy. Despite a low percentage of perennial ryegrass and a high percentage of browntop, production was high in this plot and indeed compared with that from the new pasture—a really unexpected result (see Table 1).

In the 1955-56 season yields from the oversown plot have been slightly higher than those from the sown pasture.

In both seasons the production from the control paddock was very low, only about one-quarter that of the other paddocks.

Little difference in palatability has been noted between the young sown pasture and the oversown pasture; the control browntop sward has been neglected by stock.

TABLE 1—DRY MATTER YIELDS 1954-55 AND 1955-56 SEASONS

Treatment	Dry matter 1954-55 lb. per acre	1955-56 lb. per acre
New grass	6,840	6,700
Oversown and topdressed	6,890	7,400
Control	1,710	1,350

The costs of oversowing clover seed and topdressing have been less than half those of ploughing and regrassing (see Table 2). As results from oversowing have been as good as those from ploughing and regrassing, the practice is economic.

TABLE 2—COSTS OF EACH METHOD PER ACRE

New pasture:—	£	s.	d.
Cultivation	4	9	0
Lime, 30cwt. (including cartage and sowing)	3	0	0
Fertiliser, 490lb. (including cartage and sowing) ..	2	13	6
Grass and clover seed ..	4	11	6
Total to 7 April 1954	14	14	0

Oversown and topdressed pasture:—	£	s.	d.
Lime, 30cwt. (including cartage and sowing)	3	0	0
Fertiliser, 424lb. (including cartage and sowing) ..	2	7	0
Clover seed	1	8	6
Total to 7 April 1954	6	15	6

Results from other trials on this class of country have shown that oversowing grasses (not clovers) is unlikely to be successful without prior cultivation. The possibility of introducing grass species by oversowing or overdrilling after the pasture has built up in fertility is being investigated.

Radio Broadcasts to Farmers

RADIO broadcasts to farmers will be given during March as follows:—

1XH Hamilton, 12.33 p.m.

11 March—"Stock Problems of the Month", by O. V. Griffiths, Veterinarian, Department of Agriculture, Hamilton.

18 March—"Autumn Problems on Hill Country", by H. McM. Bull, Instructor in Agriculture, Department of Agriculture, Hamilton.

25 March—"Future of the Dairy Industry", by W. Petersen, Federated Farmers, Hamilton.

1YZ Rotorua, 7.15 p.m.

6 March—Talk by officer, Dairy Division, Department of Agriculture, Rotorua.

20 March—"Farming as a Business", by A. B. T. Jordan, Instructor in Agriculture, Department of Agriculture, Tauranga.

2ZA Palmerston North, 12.33 p.m.

4 March—"Dipping of Sheep", by H. O. Mackley, Livestock Instructor, Department of Agriculture, Feilding.

11 March—"Use of Concrete on the Farm", by J. O. Brasell, Farm Machinery Instructor, Department of Agriculture, Palmerston North.

18 March—"Glasshouse Hygiene", by G. N. Paulin, Horticultural Inspector, Department of Agriculture, Palmerston North.

25 March—"Seed Testing for Type", by A. V. Lithgow, Officer-in-charge, Department of Agriculture's Seed-testing Station, Palmerston North.

2XA Wanganui, 8 p.m.

7 March—"For the Countrywoman", by Mary MacDonald.

14 March—"The Radio Vet.", by S. Jamieson, Veterinarian, Department of Agriculture, Wanganui.

21 March—Talk on Pig Keeping, by C. M. Bailey, Supervisor, Taranaki District Pig Council.

28 March—"The New Branding Act", by J. F. Munting, Livestock Instructor, Department of Agriculture, Wanganui.

2YZ Napier, 7.10 p.m.

12 March—"Common Diseases of Livestock", by J. J. Byrne, Veterinarian, Department of Agriculture, Hastings.

26 March—"Autumn and Winter Work about the Dairy", by L. W. Scott, Farm Dairy Instructor, Department of Agriculture, Hastings.

3YA Christchurch, 12.20 p.m.

4 March—"Soil Conservation Subsidies", by N. Holmes, Assistant Soil Conservator, Department of Agriculture, Christchurch.

18 March—Review of "The New Zealand Journal of Agriculture", by E. G. Smith, Instructor in Agriculture, Department of Agriculture, Rangiora.

Regular Sessions

1XH Hamilton, Mondays at 12.33 p.m. and Tuesdays at 8 p.m. (Frankton stock market report), Wednesdays at 12.33 p.m. (report from Ruakura Animal Research Station), Thursdays at 12.33 p.m., Fridays at 8 p.m. (stock sale review).

1XN Whangarei, Mondays at 8 p.m. (Northland livestock report and "Farming for Profit"), Wednesdays at 8 p.m. ("Farming for Profit"), and Fridays at 8 p.m. ("News for the Farmer").

1YA Auckland, Mondays at 12.33 p.m., Tuesdays, Wednesdays, and Thursdays at 7.45 p.m., and Fridays at 6 p.m. and 7.45 p.m.

1YZ Rotorua, Mondays at 12.33 p.m. (Waikato stock market review), Tuesdays at 7 p.m. (Hamilton stock market report), Wednesdays at 7.15 p.m. (Pig Council talk on fourth Wednesday of every other month), Thursdays at 12.33 p.m. and 7.15 p.m. (fortnightly).

2XA Wanganui, Wednesdays at 8 p.m., (Wanganui stock sale report), Thursdays at 8 p.m.

2XG Gisborne, Tuesdays at 8 p.m., Fridays at 8.2 p.m. (Gisborne stock market report).

2XN Nelson, Thursdays at 8 p.m.

2XP New Plymouth, Thursdays at 8.1 p.m.

2YA Wellington, Mondays at 7.15 p.m., Thursdays at 12.33 p.m., Fridays at 7 p.m. (Feilding stock market report).

2YZ Napier, Tuesdays at 12.12 p.m. (Hawke's Bay orchardist session), Tuesdays at 7.10 p.m., Wednesdays at 7.15 p.m. (Hawke's Bay-Poverty Bay livestock market report), Thursdays at 12.33 p.m.

2ZA Palmerston North, Mondays at 12.33 p.m., Fridays at 8.45 p.m. (Feilding stock market report).

3XC Timaru, Mondays at 8 p.m. (Pleasant Point stock market report), Tuesdays (fortnightly) at 8 p.m. (Temuka stock market report), Wednesdays at 8 p.m., and Saturdays at 10.30 a.m.

3YA Christchurch, Mondays at 12.20 p.m., Wednesdays at 7.15 p.m. (Addington stock market report), Thursdays at 12.33 p.m. and 7.15 p.m.

3YZ Greymouth, Mondays and Thursdays at 12.33 p.m.

4YA Dunedin, Tuesdays at 12.33 p.m., Wednesdays at 7 p.m. (Burnside stock market report), Thursdays at 12.33 p.m.

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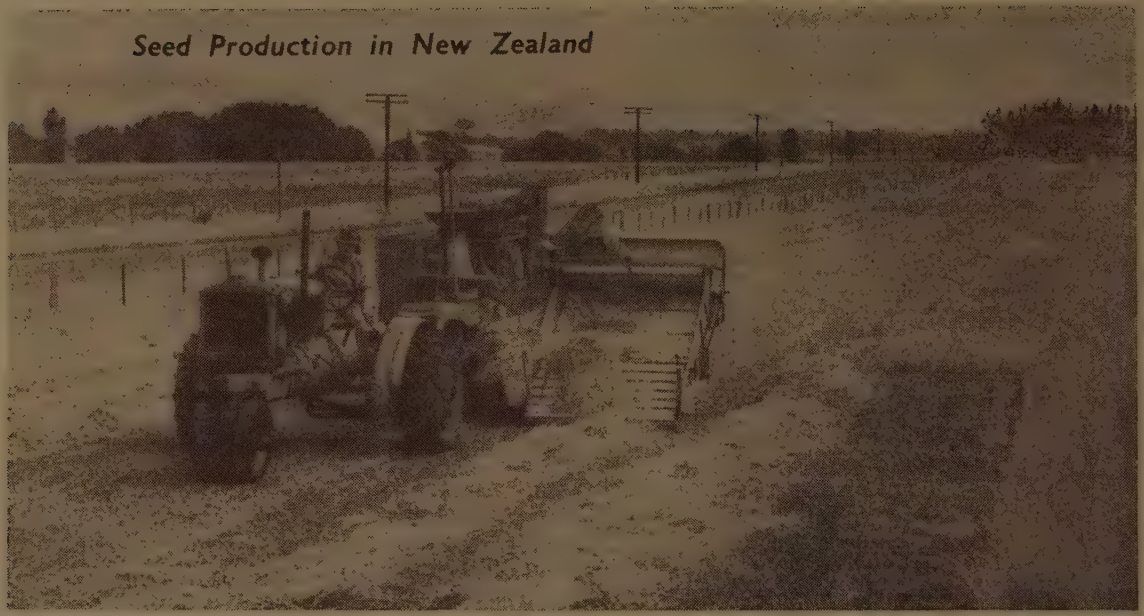


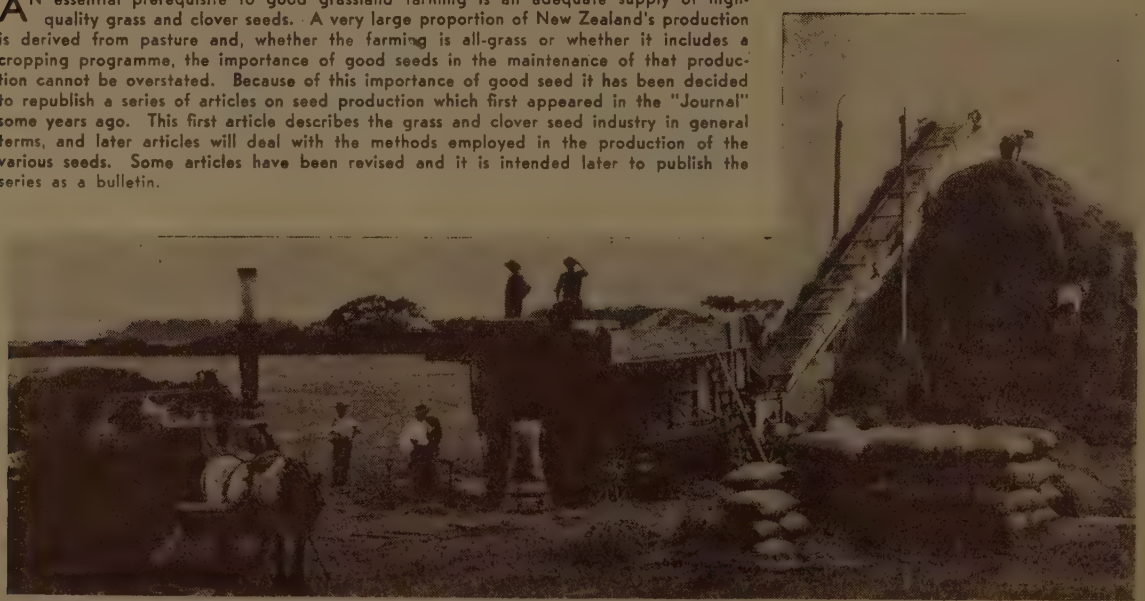
The Grass and Clover Seed Industry

By J. H. CLARIDGE,
Superintendent of the Seed Industry, Department of Agriculture, Wellington

▲ The modern method of harvesting grass seed. A header harvester picking up and threshing the crop from the swath.

▼ In earlier years the method of threshing grass seed required the crop to be carted to a stationary threshing mill.

AN essential prerequisite to good grassland farming is an adequate supply of high-quality grass and clover seeds. A very large proportion of New Zealand's production is derived from pasture and, whether the farming is all-grass or whether it includes a cropping programme, the importance of good seeds in the maintenance of that production cannot be overstated. Because of this importance of good seed it has been decided to republish a series of articles on seed production which first appeared in the "Journal" some years ago. This first article describes the grass and clover seed industry in general terms, and later articles will deal with the methods employed in the production of the various seeds. Some articles have been revised and it is intended later to publish the series as a bulletin.



THE export trade in pasture seeds is no small one, amounting in value to perhaps £2,000,000 per annum, and it increased markedly during the war. New Zealand, however, is still by far the largest consumer of the seeds produced in this country and the export market is relatively insignificant in comparison with the real purpose of the small seeds industry, which is to produce grass and clover seeds to renew, improve, and extend the pastures of the Dominion.

No accurate figures of domestic consumption of grass and clover seeds are available, the amount of seed used in any one year depending on several factors, principal of which is the area to be sown in grass each season. Another important item affecting the quantity of seed sown to the acre is the cost of the seed. It is estimated that half a million acres are sown to pasture each year, this area having remained fairly steady over a period, and on that basis the quantity of seeds required annually in New Zealand has been estimated very approximately as follows, the approximate average annual exports for the last 3 years being given also for comparison:—

	Local requirement	Export trade
	tons	tons
Perennial ryegrass ..	5,000	2,000
Short-rotation ryegrass	1,000	1,200
Italian ryegrass ..	250	700
Cocksfoot	1,000	(1)
Timothy	125	(1)
White clover	1,000	1,500
Red clover	750	500
Subterranean clover ..	300	(1)

(1) Imports of these seeds are necessary to make up deficiencies in local production.

These figures indicate the relative sizes of the local and export markets, but still fail to stress their relative significance. The export trade provides overseas funds and an outlet for surplus seed, but sowings within New Zealand are the basis of a great deal of the primary production of the country.

The United Kingdom takes about half of New Zealand's exports of grass and clover seeds, Australia being also a large buyer and America taking considerable quantities of white clover seed when prices are low.

The abnormal British demand for seeds from New Zealand at the end of the war caused prices for all grass and clover seeds, whether for local consumption or for export, to reach high levels in 1945 and 1946. The reinstatement of seed production in Europe in the post-war period caused a falling off in demand and a recession in these prices and some lines of seed were temporarily almost unsaleable. In those more seriously affected production was markedly curtailed, with the inevitable result that within a season or so one or two items were in short supply and high prices again ruled.

Whatever the individual reaction might be to these fluctuating prices, no seed producer will gainsay that prices much below the peak of the past few seasons will still leave a margin of profit to the efficient farmer. On the other hand lower prices will doubtless lead to increased consumption. It is to be expected, however, that the low-yielding areas which manage to pay a dividend only because of high prices will no longer be worth saving for seed when prices are low, and that added emphasis will then be placed on the necessity of adopting efficient methods of management and harvesting in the small seeds industry.

Farmers in New Zealand have been producing seed since the early days of European settlement.

Origin of Industry

Farmers in New Zealand have been producing seed since the early days of European settlement. The climate has concentrated production in certain areas, some of which have become famous for regional strains of superior quality developed there during the years. Names of some districts, on the other hand, have become associated with strains of inferior quality. Those facts have had a marked influence on methods of production and on the quality of seed available for sowing.

The Hawke's Bay and Poverty Bay districts, for instance, were long associated with a superior type of perennial ryegrass seed. However, because of the necessity of harvesting seed from old areas to maintain that type a limit was placed on the capacity of those districts to produce seed. Other districts where pastures of long duration were the exception rather than the rule were able to produce ryegrass seed much more cheaply, but pastures were frequently sown with a mixture containing both perennial and Italian ryegrass and repeated harvesting and resowing of seed from those areas led to the development of inferior strains of ryegrass. The Akaroa district, where cocksfoot seed was sown in the days of early settlement and the areas so established were not broken up, became famous for the type of cocksfoot produced there. To be certain of purchasing seed of Akaroa strain buyers were prepared to pay the higher prices resulting from the necessity of hand harvesting on the hills where the seed was produced.

Seed Quality

The past 25 years have brought many changes in the pasture seed industry. The introduction by the Department of Agriculture of a seed certification scheme to identify lines of seed of superior strain has not only given the buyer of Certified seed an assurance as to the type he is purchasing, but has also led to improvement in the general quality of seed being marketed. It has also had an indirect but far-reaching effect on seed production in different areas and has

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enabled the use of methods of production which were not previously possible without grave risk of deterioration in the types of the various species.

Coupled with the operation of this scheme, which was at first concerned only with superior strains developed under natural conditions, has been the work of the Grasslands Division of the Department of Scientific and Industrial Research, Palmerston North, in selecting by scientific methods improved strains of the main grass and clover seeds. Today the pedigree strains released by that division provide the basic material for seed coming under the certification scheme. This in turn has enabled the seed grower to take advantage of the increased seed yields associated with young pastures and to engage in the production of seed of superior strain, even though his farming programme does not permit the retention of individual areas in pasture for lengthy periods.

Purity and germination of the seed, like strain quality, are of greater importance than bushel weight and colour. Seeds of excellent appearance may nevertheless be dead, and the value of a line is in proportion to the viable seeds present. Impurities may consist of other crop seeds, of relatively unimportant or of serious weed seeds, and of inert matter, all of which affect the value of the seed comprising the bulk of the line.

Twenty-five years ago the Seed-testing Station of the Department of Agriculture handled about 10,000 samples a year; nowadays the number is about 40,000. That increase indicates not merely greater appreciation of a knowledge of the purity and germination of a line of seed, but also that the whole trade in pasture seeds is based on the purity and germination of each individual line.

Harvesting Methods

Many changes have taken place in farming practices generally during the past 25 years, and not the least have been those relating to the saving of grass and clover seeds. The introduction of the header harvester has revolutionised methods of seed harvesting and has led to the operation being carried out with a minimum of delay. Whereas older methods entailed transport of the crop to a stationary thresher and frequently necessitated stacking until a plant was available, most crops are now harvested by a header harvester following the swath left by the mower, and even in many cases by direct heading. In the wake of this development numerous problems have arisen which are exercising the mind and ingenuity of the seed grower.

Impurities of various kinds must be removed from all grass and clover seeds before the seeds are used. Improvements in machinery and the technique of seed-cleaning stores situated near centres of the industry have led to the production of better samples and reduced the loss of good seed to a minimum.

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All grass and clover seeds require cleaning before use to remove impurities of various kinds. Improvements in seed-cleaning machinery and technique have led to the production of a better sample of seed while reducing loss of good seed to a minimum.

For many years New Zealand has produced seed of all but three of the grasses and clovers widely used in pasture mixtures in this country, but paspalum and subterranean clover seeds have come from Australia and timothy seed largely from the United States of America, but latterly from the United Kingdom. More recently regular imports of cocksfoot seed mainly from the United Kingdom have been necessary.

Because of the climate in districts where paspalum thrives locally grown seed of this species is very unlikely to replace imported seed. Limited quantities of subterranean clover have been grown in New Zealand for a considerable time, but the harvesting of this crop presents a problem. In the meantime New Zealand is still dependent on Australian growers for most of this seed.

At present there seems to be some reluctance to grow those seeds which cannot be produced in association with the normal stock carrying of the farm. For some years both timothy and cocksfoot have had to be imported to provide enough seed for local sowings.

Change in Farmers' Attitude

Not the least notable feature of the trend in grass and clover seed production is in the attitude of the farmer. The production of Certified seed has not only given the grower more paying returns and encouraged him to sow better strains of seeds, primarily with that end in view, but has also led to the establishment of better pastures and improved carrying capacities. Particularly is that so in districts where inferior strains have developed in the past and where, as a consequence of improved pastures, increased fertility of the soil and better crop yields are also being experienced. As a reaction to the other developments many farmers have come to recognise a place in their farming programmes for the production of grass and clover seeds.

In many districts seed harvesting in earlier years was regarded primarily as a method of using surplus growth and to be undertaken "in a favourable season". Now, however, it is regarded as a normal part of farming activity and comes into the planning of the farm programme in the same manner as does the growing of other crops. Better management practices have arisen, and the saving of grass and clover seed has changed from the haphazard undertaking of past years to the planned industry now revealed.

Care of Livestock during March

Contributed by the Animal Research Division

FEED HAY TO CALVES

CALVES should have access to good hay at all times. It is particularly valuable after the first autumn rains and will greatly assist in preventing the severe scouring which sometimes occurs after the grazing of lush, rapidly growing pasture. Calves must be rotated through the paddocks at intervals of a few days. Set stocking at this time of the year is bound to result in scouring, unthriftiness, and some deaths.

LENGTH OF LACTATION IS IMPORTANT

If dairy cows are well fed, they do not need more than 60 days' rest between lactations. Dairy Board statistics show that the average length of lactation in New Zealand is only 248 days. Production could be materially increased by milking cows longer. A good rule is to continue milking a cow while she is giving more than 10lb. of fat per month, unless she is within 60 days of calving.

CULLING OF EMPTY COWS

A cow should never be culled for sterility without being examined for pregnancy by a veterinary surgeon. Many cows thought to be empty have proved to be in calf when slaughtered at the works. The presence or absence of heat is not an infallible guide in diagnosing pregnancy. Good producers which are empty may be worth keeping, as about 80 per cent. of such cows hold when mated in the following season.

SLEEPY SICKNESS IN EWES

Sleepy sickness, which in some seasons causes severe losses in pregnant ewes, is due to a sudden drop in the food supply just before lambing. On many farms the only feasible way of avoiding this is by shutting up pasture in autumn for grazing by the ewes for 3 weeks before lambing. Short-rotation ryegrass is particularly valuable for this purpose, as it continues to grow during winter even in Southland.

LEAD POISONING IN CATTLE

Many cattle die from lead poisoning each year. Common sources of lead on the farm are old paint tins, discarded scraps of metallic lead, and old batteries. These should be buried or disposed of in such a way as to prevent cattle from having access to them. Calves frequently suffer from lead poisoning through licking painted surfaces, and care should be taken to prevent this.

BLOWFLY STRIKE IN SHEEP

Blowfly strike is likely to occur in showery autumn weather when the humid conditions do not allow rapid drying of the fleece. Constant supervision is necessary to ensure that all cases are treated in the early stages. Shear the wool to leave a clean margin all round the strike. Watch carefully for narrow tracks leading to areas some distance from the original strike. Treat the affected parts with a good non-irritant dressing and be careful to collect and destroy the maggots, because if these are allowed to fall to the ground, they are capable of hatching into flies.

Jetting with preparations containing DDT, BHC, dieldrin, or aldrin will protect sheep against blowfly strike for several weeks. An article giving detailed advice for preventing blowfly strike appeared in the October 1956 issue of the Journal.

PULPY KIDNEY VACCINATION OF EWES

If losses from pulpy kidney are usually experienced in lambs under 6 weeks of age, they can be prevented only by the ewes being vaccinated. If ewes have not been vaccinated in previous years, the first dose should be injected when they are crutched before tupping, and another dose should be injected just before lambing. Ewes which have been vaccinated in previous years require only the pre-lambing injection.

Vaccination should be done in temporary yards. Syringes should be boiled before use and needles should be kept in methylated spirit and wiped and changed each time the syringe is filled. Vaccination of ewes will not be effective in preventing losses in lambs over 6 weeks of age. Where such losses occur it is necessary to vaccinate the lambs themselves.

Pasture Establishment and Management

Seasonal Notes by the Extension Division

AUTUMN pasture management plans should now receive careful attention, for pasture production during next winter and spring depends very largely on autumn management methods. Attention should also be given to final seed-bed preparation and sowing of autumn grass.

TOPDRESSING

IN the initial stages of pasture improvement with fertilisers and lime it does not matter much at what period of the year fertilisers are applied, but in the management of dominantly perennial ryegrass-white clover swards under intensive grass farming methods autumn topdressing with superphosphate is desirable. Autumn topdressing raises late autumn, winter, and early spring production and hence raises winter carrying capacity.

—H. G. B. HALLIWELL

* * *

SAVING AUTUMN FEED

MANAGEMENT of the dairy herd in autumn should be arranged so that grass is saved for feeding before and after calving. To do this it is usually necessary to start supplementary feeding in autumn while grass growth is still plentiful. There is no need to feed cows large quantities of fresh grass in late autumn, and supplementary feeding at this time enables pasture to be closed in late autumn and early winter and held over for rationed grazing in late winter and early spring. On sheep farms there are about 2 months after tupping when ewes can be done fairly hard, and during this period fields can be spelled and allowed an opportunity to freshen up for feeding before and after lambing.

—M. G. BOYER

* * *

SOWING AUTUMN PASTURES

PROVIDED weather is favourable, early sowing in autumn is desirable. Early sowing allows the first feeding off to be taken before growth stops in winter and obviates the grasses dominating the young clover plants in spring.. The success of a pasture depends very largely on a suitable balance of grass and clover plants being secured from time of establishment. Poor clover establishment is usually due to late sowing, sowing the seed on a loose seed-bed, or allowing the pasture to grow too long before grazing so that the more vigorous grass plants smother the young clovers. Inoculation of clover seeds is recommended on lower-fertility soils; inoculated seed should be covered from sunlight and sown immediately after treatment.

—W. L. OSBORN

* * *

LUCERNE SEED

IN the main seed producing districts lucerne seed areas are normally in full flower in late January and early February after two hay cuts have been taken, and seed is harvested mainly in March and April. Normally, cutting the crop with the mower and then threshing it after it has been in the swath for a period is the method that gives best results, but direct heading also produces satisfactory results under some conditions, such as when a thin crop ripens evenly or when wind is liable to blow a cut crop. A crop to be direct headed should be allowed to become as ripe as possible. Sometimes it is necessary to wait until early frosts have stopped growth and withered the leafage. Treatment with crop desiccants has also been resorted to in some instances to facilitate direct heading.

However, as lucerne seed crops do not normally ripen evenly and as ripe pods are likely to be torn off by wind, it is generally advisable to cut the crop with a mower and allow it to ripen further in the swath before threshing it. This method has the advantage of preventing loss of seed through wind damage as well as avoiding late harvesting when the weather is deteriorating. Crops should be cut when the earlier pods are black and most of the later ones are straw coloured. Seed loss will be minimised if cutting under hot, dry conditions is avoided. An inside divider is usually an advantage, and if wind is likely to be troublesome, a light drum roller may be drawn behind the cutter bar to press the swath into the stubble. Threshing with a header harvester may be done after a period ranging from a day or two to a week or more, depending on conditions. Under good conditions the seed threshes easily and very high drum speeds or close setting of the concaves can usually be avoided.

—J. P. BEGGS

* * *

RED CLOVER SEED

COWGRASS, because of its early seed setting, does not present the same harvesting problem as does Montgomery red clover, which is a late-flowering type. Cowgrass seed matures in February when dry summer conditions have dried off the plant leaf and stem, thus enabling the crop to be direct headed in February and March.

The New Zealand type of Montgomery red clover, however, tends to flower over a long period, and though seed may be mature in March, the presence of a bulk of green leafy material normally prevents the crop from being direct headed then. An alternative method is to cut the crop and leave it to mature in the swath for 10 to 12 days before threshing it with a pick-up header in March or April. This method has its disadvantages. A damp period after the crop is cut may result in second growth. This tends to grow through the swath, making it virtually impossible to pick up and thresh. Strong winds have also been known to lift a windrowed crop, resulting in a complete loss of seed. Most farmers, therefore, prefer to leave the standing crop well into winter until heavy frosts have brought about natural defoliation. As a consequence, harvesting is often as late as June and July. Over this period some seed is lost by shattering, but it is only under very adverse weather conditions that the crop is a complete failure.

Crop desiccant chemicals, capable of bringing about premature defoliation, are now being used to aid harvesting of red clover. Irrespective of the amount of leafy material present, red clover seed crops, with the aid of desiccants, can be successfully harvested within a few days of spraying. In this way the harvest can be brought forward by 10 to 12 weeks, less seed is lost, and harvesting takes place at a more suitable time of the year.

—W. V. HADFIELD

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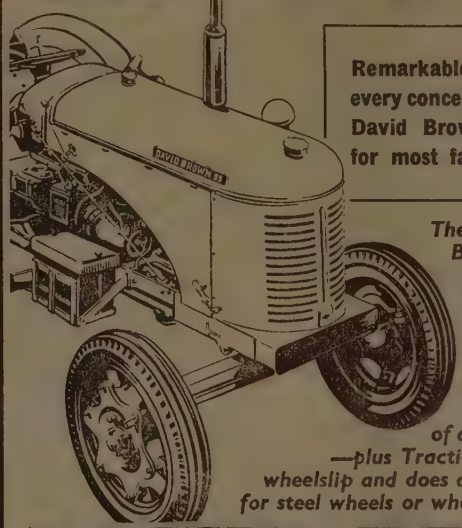

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Systems of Feeding Household Poultry Flock

By W. L. JOURDAIN,
Poultry Instructor, Department of Agriculture, Hamilton

"IT is much more important to supply the chickens with adequate quantities of all the necessary nutrients than it is to follow a given system. . . . Any system that ensures, through design or by accident, an adequate supply of all the essential nutrients is sure to be successful from the standpoint of nutrition."

IF the various systems of feeding are considered with the foregoing statement by W. Titus, Officer-in-charge, Poultry Nutrition Investigations, United States Department of Agriculture, the system that appeals can be selected with the certain knowledge that the birds will give a good return.

It is amazing how often the small backyard poultry keeper manages to obtain good, and sometimes outstanding, results mainly by accident. He is helped by the fact that only a small number of birds are run together and yet these results could not be obtained without good nutrition. Such success is mainly fortuitous, because very few backyard poultry keepers understand enough about correct nutrition to be able to claim the credit.

Methods of Feeding

Wet Mash and Grain

The most common method of feeding used over the past years is that of wet mash and grain. Except for some very strong reason, those using this method are very unlikely to change, because none of the other systems will give any better production.

One main advantage of this system is that it uses all the household scraps without any trouble and it leaves no food lying about to attract vermin. However, even with wet mash there are slight variations, such as a small grain feed first thing in the morning, mash at midday and grain at night, or mash in the morning and grain at night, or again, grain in the morning and mash at night.

The only practical drawback to this method is the time it takes to prepare the mash compared with the other systems, but this is not an important factor. Poultry appear to have very limited senses of smell and taste, but nevertheless with food they have very definite likes and dislikes, and though they prefer wet mash, this can be made unpalatable.

Wet mash to be really palatable must be mixed to the right consistency. Though it is called wet mash, it should never be fed in a wet, tacky condition. To judge the right consistency a handful of it should be taken and squeezed —this should remain in a lump, but when it is dropped to the ground from a height of 2ft. it should break up.

When grain and mash is fed it is as well to limit the amount of grain to about 2oz. per bird, and then let the birds make up the rest of their food requirements with mash. The reason for this is that the mash contains most of the essential nutrients for egg production.

However, the poultry keeper today is largely dependent on the mash manufacturer for the bulk of the mash, but the smaller and very important ingredients are left to the owner to supply.

The time taken in preparing food is not a factor of great importance to the average householder; therefore the fact that dry mash feeding is also a saving in labour is hardly relevant when the number of birds involved is anything up to 24. For this method to be really efficient the feed hoppers must be constructed in such a way that there will be little or no wastage.

Though generally the mash is kept before the birds at all times, the hoppers could be closed about 2 p.m. to sharpen the birds' appetites for the grain feed which is usually given about 3.30 p.m.

Feeding of Grain

The grain could be fed in open hoppers as is the mash, and this method should be quite successful. If it is found that the birds are eating a disproportionate amount of grain, the hopper could be closed at certain times during the day. The big advantage of the dry mash system is that it enables the householder to leave the birds all day, and possibly all the weekend, with the assurance that they are adequately fed.

Pellet Feeding

Another system which has grown much in favour during the last few years is that of pellet feeding, which makes it very easy to feed the birds. There is no mixing of mash, no worry with wastage, providing an efficient

Food costs are high today and no household poultry keeper can afford to feed any birds which are sick or unthrifty, irrespective of the system of feeding used. The illustration gives an impression of the quantity of feed—grain and mash—required to raise a pullet to the laying stage.

[*Niederer*

A type of dry-mash hopper which can be constructed from an oil drum, milk can, or any similar type of circular vessel.

hopper is used, or no worry over the supply of vitamins. This system is perhaps better than that of dry mash feeding because of less wastage. The pellets are processed from the ordinary mash mixture with the addition of an ingredient to cement the mash into pellets.

The main drawback is that the pellets cost about 30s. to £2 per ton more than the mash. Pellets can be fed alone or with grain, when the proportions should be about equal.

The all-grain system has given good results and is almost as easy to manage as pellet feeding. The same type of trough is used and the only additional work is in the supplying of the needed vitamins. These can be supplied in the form of oil which should be rubbed into the grain or as an emulsion in the drinking water. The latter is probably the easiest way and ensures that each bird receives its requirements.

Meat Meal

In addition to the mash, grain, or pellets being fed the birds also need meat meal. and the most efficient way of feeding it is ad lib. None of the mashes or pellets on the market has more than 10 per cent. of meat meal added, unless it is a special mix, and therefore the requirements of the birds are not adequately met without additional meat meal. As birds vary in their ability to produce eggs they need various levels of protein, and it is far easier to let the birds balance their own ration than to try to do it for them.

One thing the poultry keeper should be sure of is the palatability of the meat meal. It is useless placing a meat meal before the birds if they do not like it.

Vitamins

Though only a few birds are kept, the supply of vitamins must still be considered. Vitamins are necessary for the health, growth, and reproduction of all birds and animals.

The most important vitamins for poultry are A, B, D_3, and E; without these the health and growth of the birds suffer. Vitamin A can be supplied in the form of a feeding oil or in leafy green foods; B is needed mainly for hatching and growth of the young stock and is found in brewer's yeast, milk powder, and lucerne; D_3 is manufactured by the birds or supplied to them through a feeding oil or synthetic powder; and E is found in all cereal germs and the food is very seldom deficient in it.

Grit

Grit is very necessary. It is possible for the birds to get along without it to some extent, but there are two kinds of grit and they are required for two different purposes.

Lime or oyster-shell grit is required for the calcium which it contains, and this is used not only for egg-shell formation, but also for bone formation, particularly in the growing bird.

A hard grit is required to assist the bird in its digestion. Any kind of hard grit of the right size will do. though a grit with sharp edges such as crushed flint or rock is by far the best.

Green Food

Unfortunately many have got the impression that green food is unnecessary provided the birds are being given some form of synthetic vitamins. As far as the health and production of the birds are concerned this may be true to some extent, but the birds will produce better if given green food as well as the synthetic vitamins. This is a very important point and should be stressed because it is well illustrated by a report on an experiment conducted by the Department. If this report on the need of vitamin A in the diet is carefully studied, it will be found that the birds receiving green food **as well as oil** produced more eggs than any other pen.

Apart from any other reason green food is necessary for good yolk colour, and though there have been attempts to produce good colour by synthetic means, it has not become a commercial proposition in this country. Even when this does become possible, it will not replace good green food.

Litter Management

With any system of feeding exclusively by hopper, litter management is of the utmost importance. The litter in the house must be kept dry at all times, but if the birds are not fed any grain in the litter, it can be very difficult to keep it in a good friable condition. In these conditions it is vital to fork the litter over two or three times a week. A damp, matted floor is very detrimental not only to egg production, but also to the health and vigour of the birds.

A very good idea is to close up the hoppers at nights and give the birds a grain feed in the litter in the mornings. This will assist considerably in the litter movement. The addition of some lime to the litter will probably prove of more benefit in keeping litter dry than any other single factor, more particularly during winter.

SUBSCRIPTION RENEWALS

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Zig-zag Clover May be of Value in Low-rainfall Areas

By W. R. LOBB,
Assistant Fields Superintendent, Department of Agriculture, Christchurch

ZIG-ZAG (*Trifolium medium*) has been grown in New Zealand for many years, but is little known except to grassland research workers. It was recorded in Auckland Province in 1871, but attracted little attention until the work of Dr. L. Cockayne in the 1920s resulted in its successful establishment in trials on the Dunstan Range in Central Otago.

IN appearance zig-zag clover is very like red clover, having hairy leaflets and red florets, but unlike red clover it has extremely vigorous rhizomes. Its main value is its persistence and ability to survive and spread in a rigorous climate with low rainfall, though for satisfactory growth fertilisers may be required. It responds readily to phosphates, lime, or molybdenum where these materials are deficient. Though not normally a high-yielding clover, under these conditions it is superior both in production and in persistence to any other perennial clover. It owes much of its persistence to its underground growth habit and ability to overwinter in a dormant state.

Zig-zag clover growing in a trial area at Lake Tekapo. →

For this reason it has aroused the interest of grassland workers as a plant which may be of value in such areas as the Mackenzie Country and the depleted country of Central Otago.

Ziz-zag clover, showing the typical oval leaflets, long trailing petioles, and well-developed rhizomes. The flower is similar in appearance to that of red clover, the main difference being that the calyx of zig-zag clover is hairy only on the teeth, but in red clover the calyx is hairy all over. →

Its usefulness may not be confined to such areas, however, as it could find a place on the lowlands where climatic conditions are too severe for the survival of red and white clovers. Its dormant habit and its ability to recover from underground roots could be an asset on the light gravelly plains which are exposed to drying winds in the low-rainfall areas.

The main weakness of zig-zag clover, which imposes a severe restriction on its practical utilisation, is that it is an extremely shy seeder. In the past seed has been so scarce that many of the experimental plots of zig-zag clover laid down by the Department of Agriculture have been established by propagating plants from roots taken from

ZIG-ZAG CLOVER . . .

the original area in the Dunstan Range.

Late in 1950 approximately 5 acres of zig-zag clover were located on the property of Mr. R. C. Ruddenklau, in the Tapui district in North Otago, and the performance of the plant in this area is of considerable practical interest.

The age of the stand is not known, but it has possibly been there for some 20 to 30 years. During this time the area has been under cultivation on two occasions and it was recalled that the area was very difficult to plough doubtlessly owing to the mass of trailing, twitchy roots produced by this clover. The cultivation periods most probably assisted the spread of the clover and by 1950 it was dominant on all but a few patches of the paddock; the whole stand may have been derived from only a few plants.

This stand gives some indication of the behaviour of zig-zag clover in a pasture sward. The paddock was a mixture of white clover, zig-zag clover, and a trace of Montgomery red clover, with a good grass balance, dominantly cocksfoot and crested dogstail. Despite the massive roots of this clover, it did not choke out the white clover or the grass components of the sward and did not appear likely to do so.

Ziz-zag clover does not come away early in spring, and goes completely below ground early in autumn, its maximum growth taking place from late November to early March. The grasses and white clover therefore have good growing periods without competition, early and late in the season, which permit their survival.

A portion of this paddock was closed in an endeavour to procure seed. This part was cut and harvested in February 1951 and from the time of cutting until the following November it made no growth above ground. After cutting, all top growth died back and the only way to secure evidence of its existence was to dig for the twitchy root mass. Where the area was not cut it did not die back as early, remaining above ground until winter.

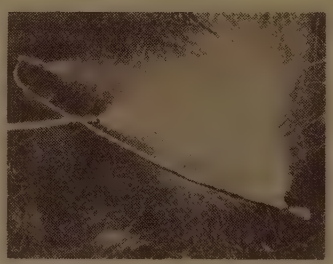
From November to January the production was good. It was slow to recover from heavy grazing, but grew well enough when growth restarted. A mob of 300 ewes and their lambs was used to control the growth in December and it carried them for 10 days. Under good growing conditions it made little recovery for a further 10 days and then it started away quite rapidly.

The existence of this area enabled the Department to obtain a small amount of seed, about 5½lb., which was utilised to evaluate the performance of the plant over a wider field than had previously been possible.

In recent years the Grasslands Division of the Department of Scientific and Industrial Research, realising the value of zig-zag clover in areas where hardiness is all important, has bred a strain with greater vigour and a much improved capacity for setting fertile seed. Seed of this strain is not yet available commercially.

A number of trials have been laid down by the Department of Agriculture in which the production and agronomic value of this new improved strain under harsh environmental conditions is being tested against other pasture legumes, such as white, red, subterranean, strawberry, and reversed clovers, alsike, lucerne, and *Lotus uliginosus* (*major*).

Basal Application of Weedicides



SUCCESSFUL control of barberry, sweet brier, and hawthorn with basal applications of 2,4,5-T and diesel fuel was reported in three papers read at the 9th Weed Control Conference in July 1956 at Timaru. A unit recently assembled and used successfully to lay down a large-scale trial consisted of a tractor-mounted, low-volume sprayer, 60ft. of hose, and a 3-nozzle hand wand (with 37.00 solid cone tips fitted), the ends of the wand being bent round so that the spray from the tips coned in to the centre of a circle of about 12in. radius. Operating at 50lb. per square inch the wand discharged about 66 gallons per hour and gave a drenching spray that effectively wet the base (that is, the ground and stems to a height of 15in.) of bushes. Large bushes were sprayed from both sides. The 2-acre plot, with well over 1000 plants per acre, was sprayed in 4½ hours by two men, the second shifting the tractor as required and keeping the hose up to the spray operator. A total of 96 gallons of a 1 : 70 mixture was used.

Such a unit could be used on a field basis to treat local infestations, and with two leads of hose and three operators an acre could be treated in about 1¼ hours.

—C. J. CROSBIE, Machinery Instructor,

Department of Agriculture, Christchurch

Work of Mt. Albert Research Station to be Demonstrated

A demonstration of the work of the Plant Diseases Division and Fruit Research Station of the Department of Scientific and Industrial Research at Mt. Albert Road, Mt. Albert, Auckland, will be given from 25 February to 2 March, when the Station will be open to the public from 9 a.m. to 5 p.m. each day.

The display of Station equipment and exhibits and the explanations of the methods used to investigate all diseases attacking plants and plant products should be of particular interest to farmers, fruit growers, and gardeners.

THE HOME GARDEN IN MARCH

MARCH is usually a quiet month in the vegetable garden, because the main winter crops such as savoy cabbage, broccoli or winter cauliflower, silver beet, and the taprooted crops such as carrots, parsnips and beetroot are well established and there is usually comparatively little sowing or planting to be done. Work usually consists mainly of keeping down weeds and controlling insect pests and diseases, tidying the garden, watering, or feeding with liquid manure. In this article A. G. Kennelly, Horticultural Instructor, Department of Agriculture, Dunedin, deals with work in the vegetable garden in March and concludes a discussion of insect pests and their control which was begun in last month's notes.

TOWARD the end of the month in districts where winters are not too severe a sowing can be made of carrots and onions for spring use. Spinach can still be sown for late autumn or winter use in most gardens, and cabbage, silver beet, and, in reasonably favourable situations, cauliflower, can be set out. In specially favoured districts where soil conditions are good, particularly in the north, sowings can be made of beetroot, turnips, and radishes.

Celery should be blanched as it reaches maturity or near maturity. Potatoes should be dug when mature. If blight is prevalent in the district, the top growth should be sprayed with bordeaux or a suitable certified fungicide. A sowing of parsley can be made to ensure continuity of supply if seed has not been sown since early spring.

Earlier-sown crops, such as lettuce, spinach, and silver beet, can be thinned or seedlings can be planted out. Where aphids infest crops they should be sprayed with nicotine sulphate, lindane, or HETP. If red spider mite is troublesome, it can be controlled by spraying with HETP or one of the certified miticides now on the market. Most relatively active insects such as caterpillars, green vegetable bugs, vegetable weevil, and their larvae can be controlled by DDT dusts or sprays.

Shallots and onions can be harvested and stored in a dry, airy place. The pods of beans and peas should be gathered before they are fully mature so that the growth of the plants will not be checked. Vegetables intended for winter and spring use, such as cauliflower, broccoli, leeks, savoy cabbage, and silver beet, should be kept weed free, and where necessary fed with liquid manure to ensure that good growth is maintained. The compost heap should be built up and rubbish infested with insect pests or bearing the spores of long-lived or highly resistant diseases should be burnt.

Carrots

Carrots do not over winter well in districts where winter temperatures are low, and in Canterbury and districts farther south autumn sowing is rarely advisable. In districts where winter temperatures are relatively mild home gardeners desiring early spring carrots should make a sowing about the end of March.

The seed-bed for carrots should be well drained and worked down to a fine tilth. Where drainage is poor it is advisable to make a raised bed, and for convenience in cultivating and harvesting the bed should be not more

[*Green and Hahn*

Celery should be blanched when it is mature or nearing maturity.

than 3ft. wide. Soil heavily manured for a previous crop is best and sandy or light loams are especially suitable for autumn crops. Superphosphate at about 2oz. a square yard is likely to give good results on most soils that have been well cared for or a complete fertiliser can be applied.

Seed should be sown thinly ¼in. to ½in. deep, according to whether the soil is heavy or light, in rows about 12in. apart. If the soil is light and free, there should be no need to thin the seedlings, but on heavier soils the plants can be thinned to about 2in. apart. If thinning is delayed, the thinnings may be used for soups and stews. A quarter of an ounce of seed will sow about 100ft. of row.

An early or quick maturing variety of carrot should be chosen for autumn sowing. A variety such as Early Horn will be found suitable.

Celery

In most home gardens the main crop of the self-blanching type of celery will be nearly mature or ready for blanching in March. Comparatively few home gardeners, except in the colder districts, now grow the older, non-self-blanching type of celery, as it is usually slower and more difficult to blanch than strains of the self-blanching type. However, the green types are usually hardier and more robust and the texture and flavour of good varieties are superior to those of self-blanching types. Green celery has a higher vitamin content than blanched celery. Red strains of celery, though not much seen in home gardens now, are particularly hardy.

Most self-blanching varieties can be blanched in from about 10 to 21 days, but with the non-self-blanching or green varieties blanching may take about 14 to 40 days according to variety, temperature, and the method adopted, that is, the extent of the blanching desired and whether it is done in stages. Blanching reduces the rather acrid flavour that some varieties of celery have when immature. Blanching is caused either by the failure of the green colouring matter to develop or more commonly by its disappearance after it has been formed, particularly with green varieties.

Self-blanching celery is usually blanched by placing 10in. or 12in. x 1in. boards, held in place by pegs, round the sides of the bed. Suitably stiffened paper such as that used by builders (for example, laminated paper tarred on the inside and strengthened by fibre) can be used if desired in place of boards. Non-self-blanching celery can be blanched similarly, but as a much longer period is required for blanching, it is usually either wrapped individually with stout paper held with string or elastic bands or earthed up in fine weather with clean, free-working, reasonably dry soil which preferably should contain little organic matter likely to cause rots and be free from the eggs of slugs or similar harmful creatures. Small or decaying outer stems should be removed first.

Blanching by Earthing up

Earthing up is the most difficult way of blanching. When it is finished the banked earth should be ridge shaped and the soil surface should be beaten smooth with a spade to shed rain. Under wet conditions rots may develop if soil remains touching the inner stalks after earthing up is completed; stems should therefore be drawn together when the soil is packed round them.

Though it is sometimes claimed that the quality of celery blanched by earthing up is superior to that of celery blanched by boards or paper, blanching with clean, odourless paper is quite satisfactory. A long strip of strong paper should be placed along the sides of the bed and held in position with heavy arched 10- or 12-gauge wire pins or hoops.

Rots often develop in soil-blanched celery in hot weather and blanching with soil is therefore most satisfactory in cool districts or in late autumn. As blanching causes a reduction in chlorophyll (the green colouring matter), it tends to check growth and therefore should not be begun until the plants are fairly mature. If, however, a good head of leaves is left at the top and if where soil is used for blanching it is not too tightly packed, plants will continue growing. Care should be taken when earthing up with soil to avoid getting lumps into the centres of plants, where damage may be caused to the developing hearts.

Self-blanching varieties contain very little chlorophyll in their leaf stems and can be blanched very quickly and simply with paper or boards. Blanching with soil is rarely practised with them, so the operation of blanching has little effect on their growth. The exclusion of light tends to make the leaf stalks more crisp and lengthens growth of the heart, which at the same time usually enlarges to some extent.

Pithiness

Pithiness is a common fault of celery and is caused by the break-down of the thin-walled cells that make up the substance of the leaf stem (as distinct from its outside and connective tissue).

It may be the result of growing conditions or it may be due to a weakness in the variety. Pithiness resulting from conditions of growth is responsible for a great deal of loss in both commercial and home-grown celery. Pithiness caused by growing conditions is mainly found in the outer leaf stalks and increases as the plants mature, whereas pithiness which is inherent in the variety is equally distributed throughout the plant.

Home gardeners who have a large planting of celery and who intend to harvest it over a long period can begin blanching when the plants are about half to two-thirds grown. Plants for salad use are best harvested without delay after the blanching material has been removed. The fibrous roots should be cut with a sharp knife or spade just below the disc-like stem or crown, which should afterward be trimmed with a sharp knife. Poor, coarse, or pithy outer leaf stems should then be removed. With most self-blanching varieties all the outer leaves have to be removed, but if a first-class variety is well grown and is harvested at the right time, few outer leaves need be discarded.

When conditions are reasonably dry onions can be hung in bunches in the garden on a structure such as is shown to cure before being stored inside.

Insect Pests of Vegetables and Their Control

(Continued from last month's issue.)

Grass Caterpillars

(See grass-grubs and subterranean grass caterpillars.)

Grass-grub and Cockchafer Beetles

There are a number of species of grass-grub, but the adult of the species commonly causing damage is a shiny brown insect usually about ¼in. to ½in. long. Beetles may be found in the soil from September. The first usually emerge in late November and the last usually early in February. They feed on the leaves and flowers of a wide range of plants. Grass-grubs and beetles are, however, usually troublesome in the vegetable garden only on soil newly brought into cultivation.

The eggs are laid in clusters of from 3 to 40 a few inches below the ground surface. They are tiny, oval, and coated with a sticky fluid, which enables them to adhere to dry objects. Eggs hatch in about 2 to 3 weeks and the grubs go through three stages, gradually increasing in size and doing ever greater damage to roots until usually from about mid-May to October they change into beetles.

Small areas such as lawns and strawberry beds can be proofed against grass-grubs by applying DDT or lindane. DDT (100 per cent.) can be used at about 3oz. to 4oz. sprayed or dusted in a carrier (such as dry sand) to ⅛ acre. Above-ground parts can be protected from beetle injury by spraying them with DDT.

From left—First, second, and third stages of grass-grub; pupa or resting stage; and adult beetle.

Grasshoppers

(For control see *crickets.)

Green Fly

(See *aphids.)

Green Vegetable Bug

Green vegetable bugs suck the sap of many kinds of plants, doing great damage. Their eggs, which are about the size of a pinhead and pale yellow at first, later turning reddish brown, occur in rafts of from 40 to 80 eggs and hatch under favourable conditions in about 10 days.

The somewhat spherical young bugs (nymphs) which appear develop in a succession of moults, during which they might be brightly coloured (red, orange, yellow, black, and green). The adults appear after the fifth moult. As yet the green vegetable bug has not spread farther south than the northern part of the South Island.

Control

Important control measures include the destruction before October of weeds and rubbish on which the adults, which are then usually a

* In home garden article in last month's issue.

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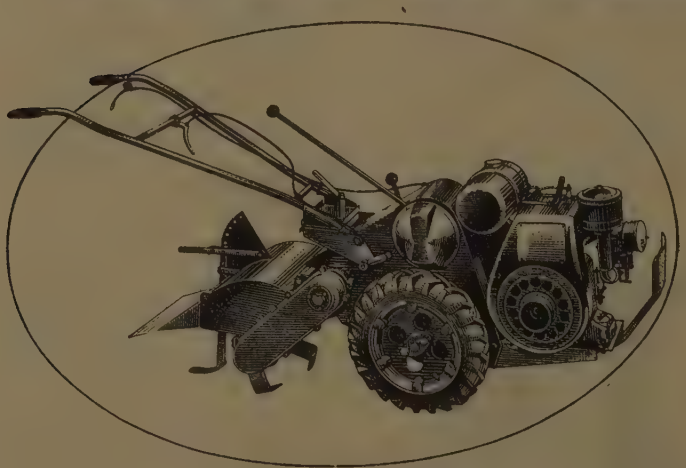

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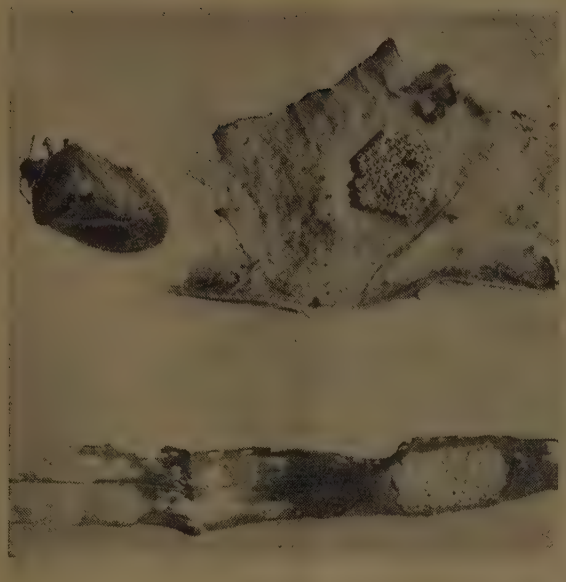
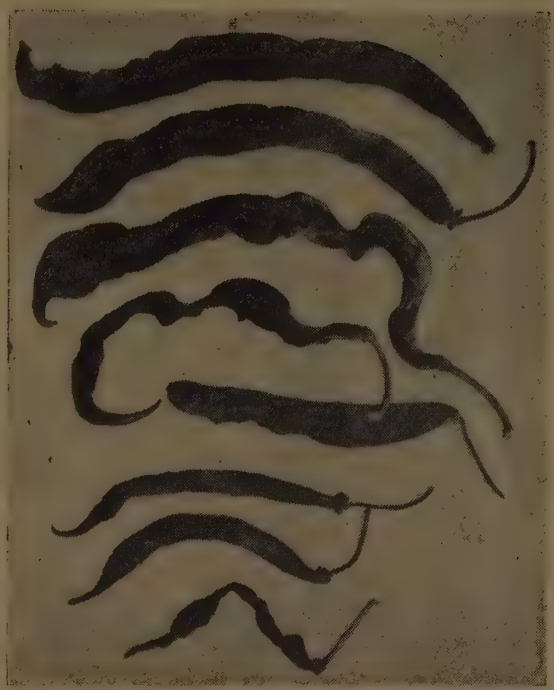


[*Sparrow*

▲ Adult green vegetable bug and egg rafts.

Beans damaged by green vegetable bug. →



dullish hue, may have overwintered and the destruction in spring and early summer of the egg rafts. DDT dusts and sprays give good control, though not as immediate as that of HETP at 1 : 400 (1 fl. oz. in 2½ gallons of water) or TEPP 38 per cent. (2 teaspoons to 4 gallons). Several days may elapse before DDT treatments are fully effective.

HETP or derris dust should be used on edible produce during the 21 days before harvesting to avoid risk from residues of poison. HETP at 1 : 400 may scorch the leaves of some plants, particularly peas, broad beans, lettuces, tomatoes, and egg plants. It should not be used on them without a trial first at a strength of about 1 in 800.

Grubs

(See grass-grubs, *carrot rust fly (larvae), *crane fly (larvae), vegetable weevil (larvae), and wireworms.)

Hoppers

(See leaf hoppers, *crickets, and *collembolas.)

Leaf Hoppers

Leaf hoppers are narrow-bodied sucking insects about ⅛in. long, usually yellowish green or buff, with wings that fold to form a ridge. The young are wingless. These insects hop when disturbed. They cause a blotching or yellowing of the foliage and occasionally a fine spotting or peppering.

Control

Leaf hoppers can be controlled by summer oil, ½ pint to 5 gallons of water plus 1 fl. oz. of nicotine sulphate, or by DDT dusts or sprays.

Leather Jackets

(See *crane fly (larvae).)

Leaf Miners

Leaf miners are the larvae or grubs of small flies which tunnel the leaves of various plants. Silver beet is commonly attacked.

Control

Protection against the egg laying flies can be given by lindane or DDT sprays. Control of the tunnelling larvae can usually be obtained by lindane sprays.

May Beetles

(See grass-grub (cockchafer beetle).)

Maggots

The maggots of various flies are often found on decaying plant tissue and in particular white maggots or eelworm-like creatures are sometimes found on decaying plant tissue where fowl manure has been applied. Most of these maggots eat only decaying tissue. (See also larvae of the vegetable weevil, *carrot rust fly, *crane fly, and *bulb fly.)

* In home garden article in last month's issue.

Millepedes

Millepedes are sometimes wrongly called wireworms from their hard, wiry appearance. They are also often confused by home gardeners with centipedes, to which they are allied but from which they differ in having two pairs of legs to each body segment instead of one pair, bodies more rounded in cross-section, no poison legs, shorter antennae, and no distinct head. They are sluggish and tend to curl up when disturbed, whereas centipedes usually escape by running.

Control

Control, apart from clean cultivation and the removal of rotting or damaged vegetation in which they may breed, consists of trapping as recommended for the control of wireworms or applying lindane or DDT dusts or dieldrin to the soil.

Mites

Mites are allied to spiders and ticks and differ from true insects in many respects. For instance, they have no wings, no distinct head, the thorax and abdomen are continuous, and the

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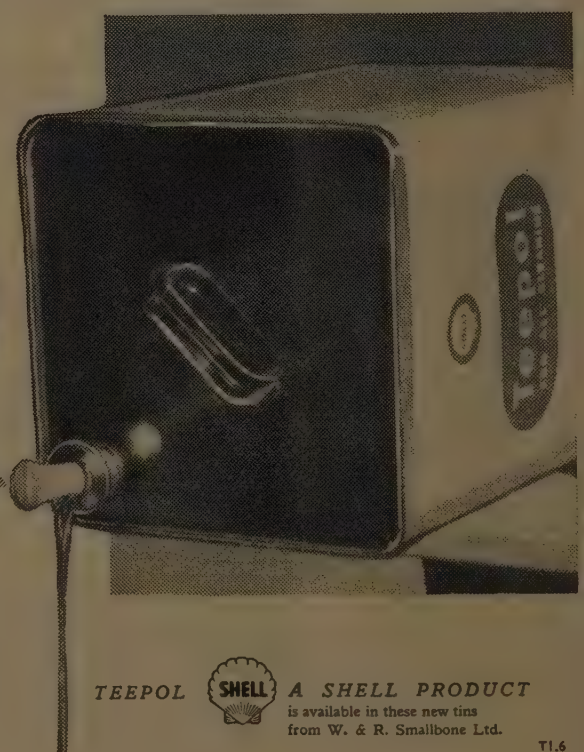

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adult has four pairs of legs (though in the nymph stage, like insects, only three).

They may be translucent, whitish or yellowish, pink, green, brown, red brown, red, or purple. Mites are tiny and some cannot be seen with the unaided eye. Only a few species are troublesome in the vegetable garden.

One of the most troublesome of these is the red spider mite, which gets its name from its habit of webbing the under sides of leaves. In late summer or autumn it turns from its early season green or a yellow-green to bright red. Its increase, like that of most other species of mite, is favoured by hot, dry weather.

Control

Miticides now available are most effective, but spraying with TEPP (containing not less than 38 per cent. of TEPP) at 2 teaspoons to 4 gallons of water or with HETP (containing not less than 15 per cent. of TEPP) at 4 teaspoons to 4 gallons of water, is also effective. Summer oil at 1/3 pint to 4 gallons of water can also be used.

These substances are also effective against clover mites, which occasionally migrate and stay for a time on horticultural crops, and red-legged earth mites, which attack vegetable crops in some districts. DDT dusts and sprays are also effective against both these mites (but not against red spider mite). The removal of weeds on which the mites feed and multiply is an important control measure.

Onion Fly

(See *bulb fly (larvae).)

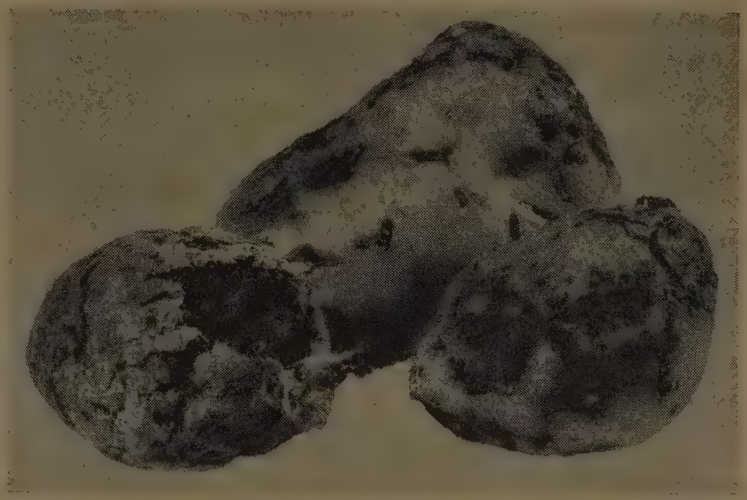
Potato Tuber Moth

The caterpillar of the potato tuber moth is pinkish white or greenish, up to ¾in. long, and has a dark brown head. It causes two distinct types of injury. First, early in the season, when young plants may be destroyed by the grubs feeding on the leaves and tunnelling into the stems; secondly, to the tubers if they are exposed while growing or if they are allowed to remain in the field for long after digging.

Serious infestation of the tubers may also occur after they have been stored. The moth, which is small, light greyish brown, and about ½in. long, flies at night. It lays 20 to 30 eggs, usually in the eyes of the tubers, but also on the leaves. The caterpillars which hatch out feed on the leaves and burrow down through the leaf stems into the stems.

Control

Potato tuber moth caterpillars can be controlled on the growing crop by a 2 per cent. DDD or DDT dust or by sprays of 50 per cent. DDT or 25 per cent. DDD wettable powder at ½oz. to 4 gallons of water. Tubers can be protected when stored before planting by dusting them with 2 per cent. DDD or DDT dust.



Green and Hahn

Potatoes infested with caterpillars of the potato tuber moth. Secondary rot has set in as a result of the original damage.

Treated potatoes used for eating should be washed carefully before any further preparation is done. Tubers should not be left exposed, especially after digging. While the plants are growing the tubers should be kept well earthed up. Tubers infested with caterpillars should not be planted.

Red Spider Mites

(See mites.)

Red-legged Earth Mites

(See mites.)

Root Aphids

Root aphids are a species of aphids which live in the soil. They are globular, greyish yellow, mealy insects about the size of a pinhead. They suck the sap from the roots, causing the leaves to turn yellow. In severe attacks the plants may wilt and die.

Control

Root aphids can be controlled by crop rotation and applying one of the following at about 3 pints to the square yard:—

Nicotine sulphate (1 fl. oz. in 4 gallons of water to which 2oz. of soft soap has been added).

HETP (4 teaspoons to 4 gallons of water) or **TEPP** containing not less than 38 per cent. of TEPP (2 teaspoons to 4 gallons of water).

Dieldrin and lindane should also give control.

* In home garden article in last month's issue.

Root Knot Eelworm

(See *eelworm.)

Slaters

Slaters are also known as pill bugs or woodlice and, with certain crabs, are among the few crustaceans that are able to live fairly successfully on land. They can survive only by living in moist places, as they breathe by gills. The young are carried in specially modified body parts on the under sides of the females. Slaters are nocturnal and mainly scavengers, but are occasionally carnivorous and may also damage seedlings or tender growth.

Control

Spraying or dusting the insects' runways with DDT will give control.

Slugs and Snails

Slugs and snails are molluscs, as are cockles, clams, oysters, octopuses, and squids. There are several species each differing in colour and size, but their habits generally are similar. They are voracious, mainly nocturnal feeders and shelter in cool, moist situations in daytime.

The feeding habits of the various species differ slightly. Some eat plant parts well above ground, others at soil level, and others tunnel and eat basal parts, tubers, or lower roots. In dry or freezing weather slugs usually burrow into the soil, emerging whenever temperatures and moisture are favourable. Snails usually hibernate during severe winter weather, usually in dry, sheltered situations.

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[*Department of Scientific and Industrial Research*

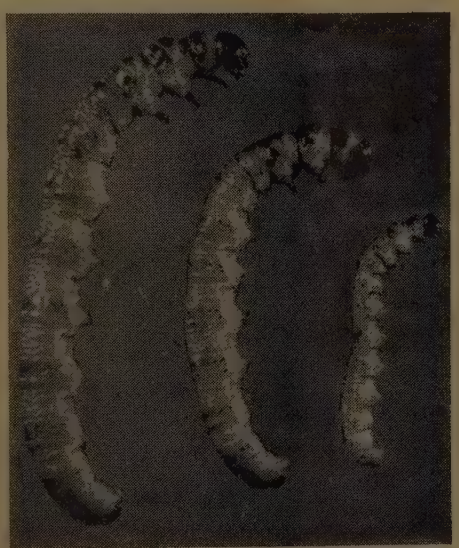
Appearance of part of an onion leaf damaged by thrips (upper) compared with that of an undamaged leaf (lower).

Slugs and snails are difficult to control in damp conditions where growth is heavy and are usually most destructive in wet seasons. As they are hermaphrodite, every individual can lay eggs.

Control

The best control is a bait of 1oz. of metaldehyde mixed with 3lb. to 4lb. of bran or similar feeding stuff and broadcast thinly or placed in small heaps about 12in. apart over infested areas on a mild evening when the soil is damp. Bait left in heaps should be covered with material such as small pieces of wood to protect it from birds and prevent rain reducing its efficacy; if so protected, it will remain effective for weeks.

Some species of slugs and snails tend to return night after night to the feed they have become accustomed to and as far as practicable baits should be applied before they have acquired the taste for other food. Metaldehyde is attractive to them and quick acting, making them incapable of movement, though if they have not had a lethal dose they recover to some extent the next day and, unless caught by sun or birds or other enemies, may escape.



Subterranean caterpillars at three stages of growth.

In small gardens slugs and snails can also be controlled by using a torch and spearing them with a length of sharpened wire at night and dropping them in a bucket of hot or salty water. They can also be snipped with scissors.

Copper sulphate has also proved effective as a contact poison, though it is injurious to the foliage of many plants. Copper sulphate should be dehydrated by heating it until it is finely powdered and almost white, and then mixed with about nine times its weight of hydrated lime. The mixture should be broadcast on a mild evening on the area frequented by the slugs or snails. Alternatively finely powdered copper sulphate can be mixed with equal parts of lime or fertiliser and broadcast thinly.

Springtails

(See *collembolas.)

Stem-borer Caterpillars

Tomatoes are often attacked by the stem-borer caterpillar, which is usually about ½in. long and greyish green to pink with a dark head. The adult moth is small, greyish brown, and lays up to 300 eggs on the foliage or stems of the plants, usually during early spring. The caterpillars which hatch out bore into the stems or leaf stalks, hollowing them and causing the plants to collapse.

Control

For control, the plants should be sprayed from planting out and at fortnightly intervals with 50 per cent. DDT wettable powder or 25 per cent. DDD wettable powder at ½oz. to 4 gallons of water. Old tomato plants should be burnt and potatoes growing nearby should also be sprayed with DDD or DDT.

Subterranean Grass Caterpillars

Subterranean caterpillars are often confused with grass-grubs, but are the larvae of harmless moths about 1in. long with wings variably marked but usually shaded black, brown, and tawny. The moths are rather sluggish and at night are often attracted to lights in houses. The different species appear at different times of the year.

* In home garden article in last month's issue.

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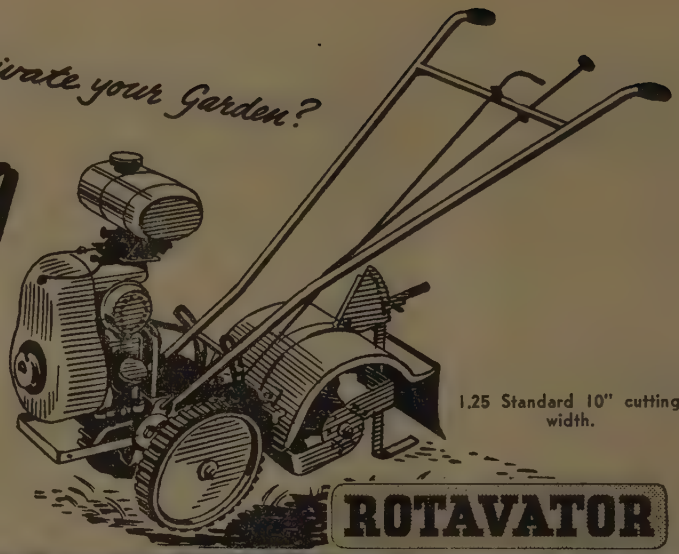

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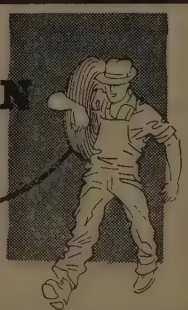

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The eggs of the most destructive species are small, oval, and usually laid in October. They hatch in 3 to 5 weeks. They are white when first laid, but most soon turn jet black.

The caterpillars are greyish black. They are very small in November, but up to 4in. long by about the end of the following August. During the day they lie in a tunnel they make up to about 10in. deep, but emerge at night, usually to eat grass foliage and occasionally the foliage of other plants.

Control

The subterranean caterpillar can be controlled to some extent by the use of the bait recommended for cutworms, but best results are obtained from use of DDT or lindane used according to the manufacturer's instructions.

Surface Caterpillars

(See *cutworms and subterranean grass caterpillars.)

Thrips

There are several species of thrips, but generally they are minute (1/15in. to 1/25in. long), elongated, and rather pointed at both ends. The adults, which are usually yellowish brown to brown or black, have two pairs of narrow, fringed wings, which enable them to fly considerable distances. The nymphs resemble the adults in shape, but are wingless, usually green, yellow, or yellowish brown and do not move far from their feeding area.

Thrips rasp the leaves and suck the sap, often producing on plants such as tomatoes a silvery effect. They are favoured by warm weather and attack a great range of flowers, fruit, and vegetables, often spreading disease.

Control

Thrips can be controlled fairly effectively by DDT dust or spray or TEPP or HETP spray.

Vegetable Weevil and Grub

The vegetable weevil is dark brown or greyish brown, about 1/3in. long, and rather slim with a typical snout. It has a greyish white V on the back. The fully grown grub is ½in. long, plump, legless, and sluggish, green to greyish green, and has a blackish brown head. Adults hide during the day, usually about the bases of plants. The weevils are particularly destructive to carrots, beetroot, lettuces, potatoes, tomatoes, and turnips, and feed on a wide variety of weeds. Crowns of seedlings are commonly eaten out.

[*Green and Hahn*

Wireworms.

The vegetable weevil (adult beetle, left, and grub, right).

Control

To control the weevil, clean cultivation should be practised, though destruction of weeds late in the season will cause the weevils to migrate to crop plants. A poison bait as advised for cutworms or DDT dust or spray can be used. If an insecticide is needed during the final 21 days before harvesting, derris should be used.

White Butterfly

(See *caterpillars.)

White Fly

White flies are rarely troublesome in the vegetable garden, though they sometimes attack tomatoes under glass. When they are numerous plants become sticky and blackened by the growth of a sooty mould which develops on the copious quantities of honey dew they secrete.

Eggs are laid on the under side of foliage, each egg having a short stalk inserted into the leaf tissue. The young, oval insect is at first mobile, but later settles down, becomes flat and begins to feed. Later it changes to another form without legs and antennae and it resembles a scale insect at this stage, but it differs because of the erect spine-like development which arises from the flat upper surface, which is raised on a thickened margin or wall. The winged insect is common and may be very numerous in summer.

Control

Control under glass is by fumigation with tetrachlorethane or spraying with malathion or DDT.

Weevil

(See vegetable weevil, *bean weevil.)

Weta

(See *crickets.)

Wireworms

Wireworms are worm-like grubs, but are hard and wiry with a segmented outer casing, usually reddish brown or brownish black. They have three pairs of legs behind their heads, which have powerful jaws with which they eat germinating seeds, plant roots, tubers, insects, or even other wireworms. They are the grubs of long, comparatively narrow, hard black beetles.

These beetles usually can be distinguished from the beneficial carabids (hunting or ground beetles) by the lack of pincer-like jaws and metallic colours and by the apparatus on the under side of the first two segments of their thorax (the middle segment of the body) which enables them when turned on their backs to right themselves with a click, from which has arisen the common name of click beetle.

Control

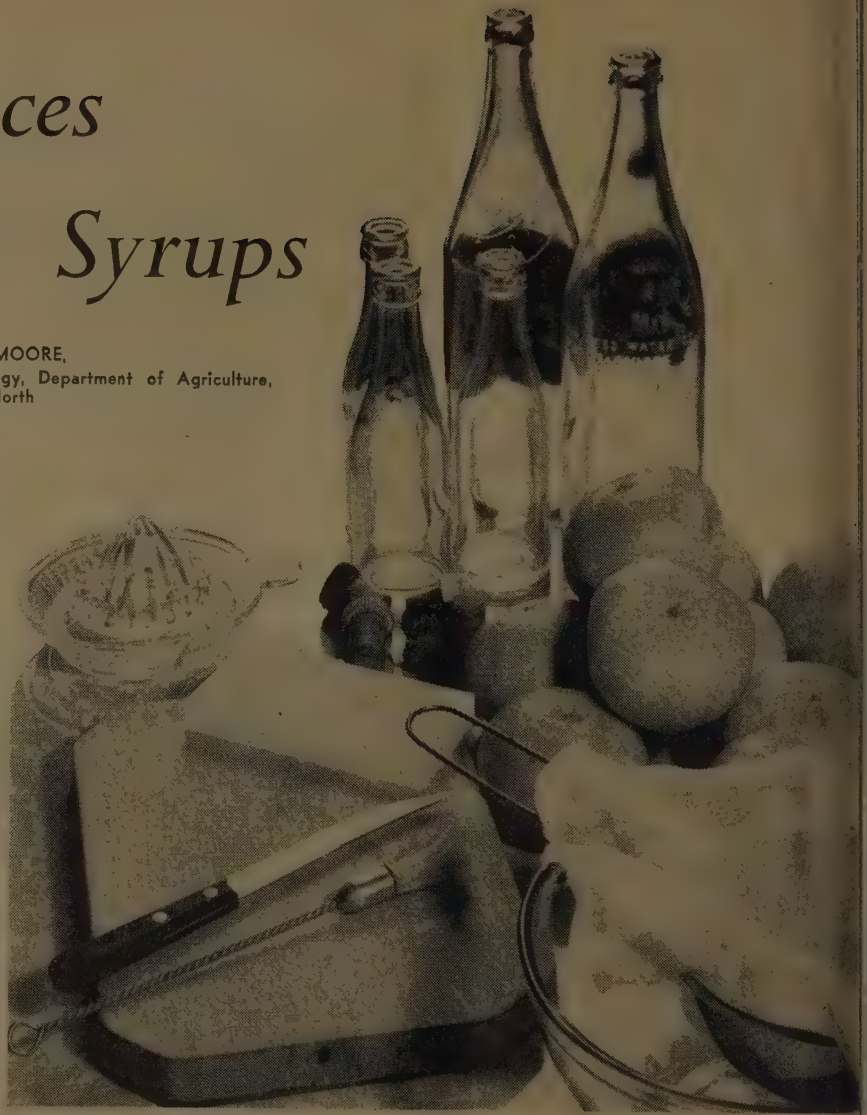
In the past for the home gardener control of wireworms has usually consisted of clearing away all rubbish likely to harbour the beetles and the use of baits such as potatoes, seed, or vegetable parts buried an inch or two under the ground and marked with a stick. After a few days the baits are dug up and the wireworms attracted to them destroyed.

In small areas the method is fairly successful on fallow ground, if persevered with, but the most effective control is to dress the soil with either dieldrin or aldrin, DDT, or lindane (sometimes sold mixed with fertiliser).

* In home garden article in last month's issue.

Fruit Juices and Syrups

By EVELYN E. MOORE,
formerly Field Officer in Rural Sociology, Department of Agriculture, Palmerston North



Equipment and fruit for making grapefruit juice.

PROBABLY comparatively few New Zealand housewives bother to bottle their own fruit juices and syrups, even when they preserve large quantities of fruit and vegetables. The comparative cheapness of artificial fruit syrups and packet jellies and the ease with which they can be prepared are probably responsible for this, but though home-made fruit juices take longer to prepare, the extra time should be compensated for by their flavour and nutritive value, which are better than those of juices which are artificially coloured and flavoured. Many surplus fruits which are allowed to go to waste in farm home gardens could be used to make nutritious and flavourful fruit juices and syrups. This article describes the method for preparing fruit juices and suggests a few ways of using them.

Bottling Fruit Juices

ANY fruit juice may be bottled successfully. Some, such as black currant, grapefruit, and orange juice are a good source of vitamin C, and all are a useful addition to any store cupboard. They may be used for fruit drinks or for making jellies, fruit whips, sauces, and ice cream and for flavouring. In addition, they provide means of using soft, juicy, ripe fruit, sour outdoor grapes, and other surplus fruits not needed for bottling or for jam. Only really ripe, juicy fruit should be used, however, as otherwise it is difficult to extract a good percentage of juice, and the flavour of the juice is also better.

Preparation of Equipment

Ordinary jars and lids, oddly shaped jars or jam jars which may be sealed with plastic preserving skin, or bottles with corks or crown seals may be used.

Careful checking for cracks, chips, and other faults and of lids or preserving skin as in ordinary bottling is required. If bottles and corks are being used, it is preferable to use new corks, which should be sterilised in boiling water for 10 minutes. They should be held under the water with a small pot lid or a wire basket. Old corks should be boiled for 1 hour. A water bath, as for ordinary bottling, paraffin wax for sealing corked bottles, a colander, jelly bag, juice extractor or lemon squeezer (according to the type of fruit), a large saucepan, and other equipment such as sharp knives, jar holders, tongs, large spoons, and pot holders are also necessary and should be assembled beforehand. Special juice extractors or presses such as the juice extractors attached to some electric mixers, as well as electric liquidisers or blenders are useful.

Preparation and Cooking of Fruit

Fruits Other than Citrus

Wash the fruit and if necessary, cut it up roughly. Remove all bruised or blemished portions. Place the fruit and water in a large saucepan or preserving pan (not copper), allowing about ½ pint of water to each 6lb. of fruit. It may not be necessary to add any water to soft, juicy fruits which can be squashed and broken up with a spoon or potato masher.

Heat the fruit very gently, taking care not to boil it, until the juice flows readily and the temperature is 140 to 160 degrees F. If necessary, the fruit may be crushed and reheated to the same temperature.

Boiling spoils both the flavour and colour of the juice.

While the fruit is still hot tip it into a press, juice extractor, scalded jelly

bag, or colander to strain off the juice. A jelly bag should be squeezed to remove all the juice unless it is desired that it be clear and sparkling. Cloudy juice is produced by the other methods, but the flavour is unimpaired and less time is required.

Preheating is recommended, even when juice extractors are available, as otherwise, unless special precautions are taken, the fruit juice can very readily develop an unpleasant flavour and its vitamin content is apt to be impaired. If it is not to be heated, it should be bottled and sterilised without delay to destroy the enzymes which cause browning and darkening of the juice and development of an off flavour, sometimes described as hay-like.

Citrus Fruits

Fully ripe, juicy citrus fruit should be used. Squeeze the juice into glass, enamel, or porcelain dishes, as metal ones may taint the juice. When as much juice as possible has been strained out it should be set aside to allow the sediment to settle (½ to 1 hour) and then strained through a scalded jelly bag or cheese cloth. Besides clearing the juice this also removes pieces of pith which might cause the development of a slightly bitter flavour.

Addition of Sugar

Sugar improves the flavour and helps preserve the colour of the juice. The amount required varies according to taste and the flavour and variety of the fruit, but about 3oz. to 4oz. may be added to each pint of juice. Grapefruit juice may require more (up to 6oz.), and orange and lemon juice being prepared for drinks to which water will be added may have equal quantities of sugar added. Tomato juice may have ½oz. of sugar added to each pint, and if the pulp is thick, ¼ pint of water.

After adding the sugar heat the juice gently, stirring until it is dissolved.

Bottling

After dissolving the sugar pour the hot juice into hot, sterilised bottles or jars. Fill the bottles up to about 1in. to 1½in. from the top and cork them. Corks should not be put in too tightly and should be tied on with a piece of string to prevent them being forced out. Jars of juice are treated according to the type of seal being used (as in ordinary bottling).

Prepare a water bath as for ordinary bottling. Jars should stand upright in the water bath, but if bottles reach above the level of the water, they may be laid on their sides. The water should be about the same temperature as the juice in the containers. Bring the temperature to 180 degrees F. and hold it at that for 20 minutes. Tomato juice should be sterilised at 190 to 200 degrees F. for 20 minutes.

The water in the steriliser should not be allowed to boil, as this detracts from the flavour of the juice, particularly of citrus juices.

After sterilising, the bottles or jars are removed from the water and securely sealed. Lids and skin seals are treated according to the type being used, and bottles with corks should be cooled slightly until the cork is drawn farther into the bottle and then sealed by dipping the corks and tops of the bottles in melted paraffin wax. Jars or bottles should be labelled and stored in a cool, dark place.

Some Special Recipes

Plum Juice

Use fully ripe, juicy plums, preferably with a good colour. As plum juice usually has a good flavour, add ½ to 1 pint of water to each pound of fruit before heating. Add ¼ to ½ cup of sugar to each cup of juice for sweetening. Process in the usual way.

Rich, red plum juice can be used to flavour and colour many gelatine desserts; heated and thickened with cornflour it makes an attractive sauce for steam puddings and can be used also for fruit drinks for children.

Tomato Juice

Use fully ripe, deep red tomatoes. Trim off all green, yellow, and damaged areas, and cut out the stem ends. Halve or quarter the tomatoes and heat to boiling point, stirring constantly. If the tomatoes are really ripe and all hard pieces have been removed, no further cooking should be needed. Put the fruit through a sieve or colander, add salt (about 2 tablespoons to 1 gallon of juice), bottle, and sterilise.

Lemon Syrup or Squash

1 pint of lemon juice
3lb. of sugar
1½ pints of water
½oz. of citric acid (optional, but desirable if Meyer lemons are used)

Wash the lemons and grate the rind. Add the rind to the sugar and water and warm and stir until the sugar is dissolved and the mixture is hot. Strain, add the lemon juice, mix well, bottle, and sterilise.

Orange Syrup or Squash

1 pint of orange juice
1½lb. of sugar
1½ pints of water
1oz. of citric acid

Prepare in the same way as lemon syrup.

[*Sparrow*

Fully ripe, deep-red tomatoes should be used for tomato juice, which is a delicious appetiser.

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Uses

The most popular way of using bottled fruit juices is in fruit drinks, diluted with water according to taste or served, diluted with water, with fruit salts or Boston cream, either of which makes the effervescent drinks preferred by some children.

Boston Cream

1½lb. of sugar
1½ pints of water
1 tablespoon of cream of tartar
1 egg white

Boil the sugar, water, and cream of tartar together for 10 to 15 minutes. Cool and add the egg white beaten to a foamy consistency and stir it well into the liquid.

Use the mixture in the proportion of ⅛ to ¼ cup to ¾ cup of water or diluted fruit juice, add ½ to 1 teaspoon of soda, stir, and drink at once while it is effervescing.

Fruit Drinks

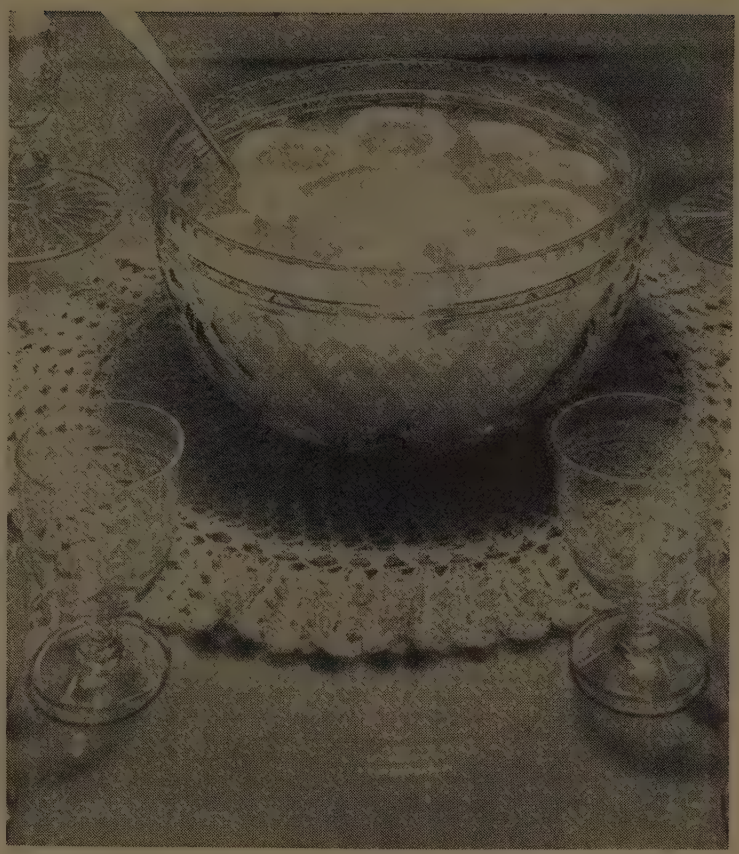
The addition of small quantities of citric acid and a little extra sugar to fruit juices will make them go further for fruit drinks. The amount added depends on the acidity and sweetness of the fruit, but strongly flavoured fruits may have up to 2lb. of sugar and 1oz. of citric acid added to each pint of juice.

Fruit Punch

(for a party)

3 tablespoons of tea
1 quart of boiling water
3 cups of sugar
5 quarts of crushed ice
¾ cup of lemon juice (fresh or bottled)
1 pint of orange juice (fresh or bottled)
1 medium tin (1 pint) of pineapple juice

Make the tea with the boiling water and strain it after about 3 minutes. Add the sugar, stir until it is dissolved, and leave to cool. Add the fruit juices and crushed ice. Decorate with mint, cherries, sliced lemon, or lemon curls or with orange, banana, or strawberry slices.



[*Sparrow*

Fruit punch is a delicious refreshment at all times and is especially suitable at a party.

Alternative

Use 1 to 1½ cups of mixed fruit juices (tea may be added if desired) and 1 cup of ginger ale. Chill these separately and mix them just before serving.

Milk Shake

¼ cup of fruit syrup (use strongly flavoured juices such as orange, plum, raspberry, and black or red currant)
¾ cup of chilled milk
1 teaspoon of sugar
1 small dessertspoon of ice cream (optional)

Shake the mixture vigorously in a quick mix shaker or beat it with a rotary beater or electric beater or blender.

Banana Milk Shake

Add to the milk shake recipe one fully ripe banana, peeled, mashed, and beaten until smooth with a rotary beater or sieved. This makes a delicious and attractive variation for special occasions.

Desserts

Fruit Jelly

1 pint of fruit juice (or ¾ pint of fruit juice and ¼ pint of water)
1 tablespoon of lemon juice (desirable if the fruit juice is sweet and mildly flavoured)
2 dessertspoons of gelatine
½ to 1 cup of sliced fruit such as bananas, oranges, or other fruit (optional)

(4 servings)

Heat 1 cup of the fruit juice to boiling point; soak the gelatine in ¼ cup of water or fruit juice and add it to the boiling hot fruit juice, stir until the gelatine has dissolved, and add the remaining fruit juice and the fruit. Pour into a mould or serving dish and leave in a cool place to set.

Fruit Foam

Prepare the jelly as in the previous recipe, using an extra ½ dessertspoon of gelatine. When it is beginning to set whip it until it is foamy and fold in 1 to 2 stiffly beaten egg whites (beaten up with 1 to 2 tablespoons of sugar added to each egg white) or 1 cup of stiffly whipped cream. This makes a richer party sweet which is attractive decorated with crystallised cherries, chopped nuts, blanched almonds, or hundreds and thousands. (4 to 6 servings)

Sauce for Steamed Puddings

2 tablespoons of cornflour
¼ cup of sugar (less will be required if the fruit juice is sweet and mild flavoured)
¾ pint of fruit juice
1 teaspoon of lemon juice (optional)
1 tablespoon of butter
1 teaspoon of cinnamon (optional)

(2 cups of sauce)

Heat the fruit juice in a saucepan with the sugar and cinnamon, leaving a little aside to mix to a thin paste with the cornflour. Add the cornflour paste to the fruit juice and cook until the mixture thickens and clears, stirring constantly. Cook gently for 3 minutes, add the butter and lemon juice, stir until the butter melts, and serve hot.

FRUIT JUICES . . .

Pear Cobbler

(using bottled orange juice)

1 quart jar of pears (or 1½lb. of cooked pears)
½ cup of orange juice
¾ cup of brown sugar
1 tablespoon of cornflour
¼ teaspoon of salt

Dumpling Mixture

1 tablespoon of sugar
1 cup of flour
2 tablespoons of butter
½ cup of milk
2 teaspoons of baking powder
¼ teaspoon of salt

(6 servings)

Drain the pears and reserve 2/3 cup of the juice. Put the pears cut side up in a shallow baking dish (about 10in. x 6in.). Combine the fruit juices, brown sugar, cornflour, and salt and pour them over the pears. Place in a hot oven (425 degrees F.) for 5 minutes. Make a soft scone dough with the sugar, flour, baking powder, salt, butter, and milk. Drop 6 spoons of the dough on top of the pears and bake at 425 degrees F. for 15 to 20 minutes or until the dumplings are browned. Serve warm with whipped cream.

Savoury Dishes

Fish and Tomato Stew

1½ cups of peeled, sliced potatoes
½ cup of peeled, sliced onions
4 tablespoons of dripping
2 tablespoons of chopped green pepper (optional)
1 pint of tomato juice
1 cup of water
1 teaspoon of salt
¼ teaspoon of pepper
1 teaspoon of thyme
½lb. of cooked, flaked fish

(4 servings)

Fry the onions and potatoes in shallow fat until lightly browned. Add all the ingredients but the fish flakes and cook until the potatoes are tender. Add the flaked fish and simmer for a further 5 minutes. Thicken if desired.

Jellied Salmon Mould

2 tablespoons of gelatine
½ cup of cold water
¾ teaspoon of salt
¼ teaspoon of pepper
½ teaspoon of Worcestershire sauce
1 pint bottle of tomato juice
2 tablespoons of lemon juice
1 8oz. tin of salmon
1 tablespoon of chopped onion
½ cup of chopped celery
2 hard boiled eggs

(6 to 8 servings)

Soften the gelatine in the cold water. Add the salt, pepper, and Worcestershire sauce to the tomato juice. Bring to the boil, add the lemon juice and softened gelatine, and stir until the gelatine is dissolved. Chill the mixture until it is slightly thickened. Flake the salmon, mix with the onion, celery, and chopped eggs, and fold the mixture into the thickened gelatine. Rinse a mould in cold water and pour in the gelatine mixture. Chill until firm. To serve remove from the mould and serve with lettuce leaves.

A "New Look" for an Old Fire-place

[*Sparrow*

VERY often in older homes there are in the bedrooms, and for that matter in other rooms, fire-places which have little if any use. The illustration above shows how one such fire-place (shown in its original form below) has been given a "new look".

To achieve this a piece of pegboard has been cut to fit in to one of the grooves on the wooden surround of the fire-place and then tacked on to the surround in each corner. The tacks give adequate firmness, yet are very simple to attach or to remove should the fire-place be needed.

If desired the pegboard can be painted to tone in with the colour scheme of the room. The most satisfactory paint to use is one with an oil base and for best results it is wise first to coat the board with a paint sealer.

Hooks of various shapes and sizes made specially for pegboard are now available on the market. These are sufficiently strong to support various decorative objects, for example, the pot plant shown in the illustration above. With this transformation an old fire-place can become a major part of the decorative scheme of a room.

—*CHRISTINE LYONS,*
Field Officer in Rural Sociology, Department of Agriculture, Auckland

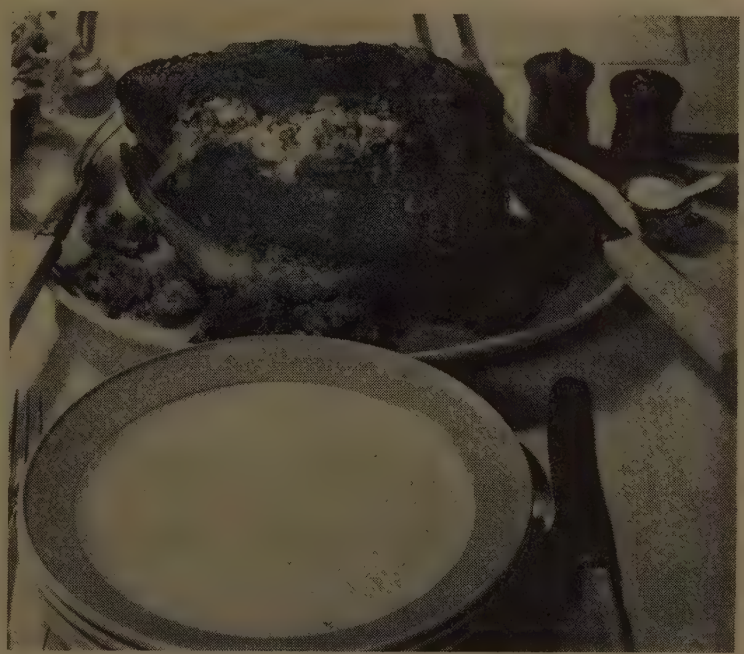
Variety with Veal

By MARY HUNT,
Field Officer in Rural Sociology, Department of Agriculture, Christchurch

VARIETY is the key to interesting and appetising meals. As meat is the food around which a great number of meals are planned, it should be served in as many ways as possible. New Zealanders do not eat much veal, and one of the reasons for this may be that many housewives do not realise what a tasty variation to the menu veal can be. A few of the many ways of cooking and serving different cuts of veal are described in this article.

VEAL is the meat from a calf which may be anything from 6 to 12 months old and weighing 60lb. or more. Veal should be paler and have less intermingling fat than beef, though as the meat is often taken from a beast nearly 12 months old, it may be difficult to distinguish it from beef. The external fat should be white and brittle.

Poorer grades of veal will be soft, coarse grained, and brown to dark tan. The fat may be tinged with yellow. The New Zealand Standards Institute has laid down that all meat to be sold on the market must be graded according to quality and marked with grad-



Roast veal stuffed with veal forcemeat. Any extra stuffing can be formed into forcemeat balls, fried, and served round the meat.

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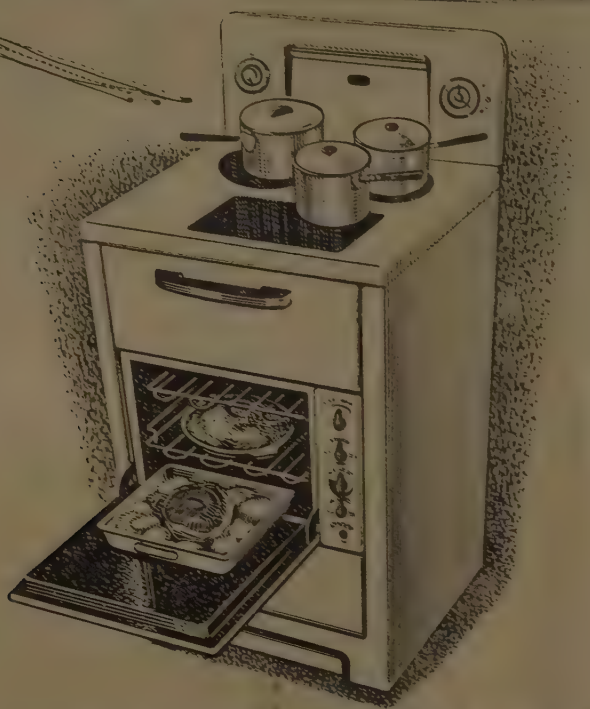

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ing stripes. The grading marks for veal are:—

First grade, one red stripe
Second grade, one violet stripe
Boner grade, two chocolate stripes

Food Value

Veal contains less fat than beef, which means that though it has a lower energy value, it has a higher percentage of protein. It contains small amounts of Vitamins A, B_1, and B_2 and some calcium and iron.

Cuts

Only the tender cuts are suitable for cooking by dry heat methods such as roasting or frying. Grilling (broiling) is not a suitable way of cooking veal, as being a lean meat it requires cooking with added fat or moist heat. Cuts which are suitable for dry heat cooking are the fillet, the loin, the shoulder, and the ribs. All the less tender cuts should be cooked by moist heat methods such as pot-roasting, stewing, braising, in a pressure cooker, or boiling as for soups.

Roast Veal

As it is from a young animal, veal is tender, but because of an abundance of connective tissue it requires long, slow cooking, with the oven at a constant temperature. The roast should be placed fat side uppermost in the roasting pan and extra fat added. If it is a particularly lean roast, lay pieces of fat pork or bacon across the top of it. Cook it in a slow oven (300 degrees F.).

Serve bacon rolls round the meat. Other suitable accompaniments for hot roast veal are forcemeat balls, bread sauce, rice, mushrooms, or onion sauce. Any pickles or relishes can be served with a cold roast. Veal forcemeat is recommended for stuffing veal, and apricot stuffing is also suitable, but other stuffings may be used according to taste.

Veal Forcemeat

2oz. of breadcrumbs
½oz. of butter
½ tablespoon of chopped parsley
Salt and pepper
1 teaspoon of grated lemon rind
1oz. of ham (chopped)
½ teaspoon of mixed herbs
1 egg (beaten)
2 tablespoons of milk to bind

Mix together the dry ingredients and the ham and add the egg and milk. Any forcemeat that is left after the veal is stuffed can be formed into balls, fried, and served round the meat.

Apricot Stuffing

To plain bread stuffing made with 4 cups of breadcrumbs add 1 cup of chopped celery, 2 tablespoons of chopped parsley, and 1 cup of chopped dried apricots.

Fried Fillets of Veal

1½lb. veal fillets (cut in thin pieces)
Flour (seasoned)
3 tablespoons of oil or butter
Salt and pepper
¼ cup of maitre d'hotel butter (see recipe on page 205)
8 to 10 small mushrooms (cooked)

(4 servings)

Fried fillet of veal garnished with maitre d'hotel butter and served with bacon rolls and asparagus.

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Dip the veal in the seasoned flour and fry it in the oil. Garnish with mushrooms and maitre d'hotel butter. Serve with asparagus, bacon rolls, or grilled tomatoes (or all three).

Maitre d'Hotel Butter

¼ cup of butter
½ teaspoon of salt
Pepper
2 teaspoons of lemon juice
2 teaspoons of chopped parsley

Cream the butter and gradually stir in the remaining ingredients. When the butter hardens a little roll it into balls.

Breaded Veal Cutlets

4 veal cutlets
1 egg (beaten)
Breadcrumbs
¼ teaspoon of thyme
1 teaspoon of salt
Shake of pepper
2 tablespoons of chopped onion
¾lb. of tomatoes (sliced)
A little chopped green pepper (if desired)
Fat for cooking

(4 servings)

Dip the cutlets in the beaten egg and roll in the seasoned breadcrumbs. Cook the cutlets in fat until lightly browned on each side. Cook the green pepper in fat for a few minutes. Put the cutlets and green pepper in a saucepan and add the tomatoes, onion, and a little water. Cover and simmer gently until the meat is tender (about 1 to 1½ hours).

Veal Steaks in Cream Sauce

1½lb. of veal steaks (cut in thin pieces)
Flour
Fat for frying
½ cup of cream (preferably sour)
Salt and pepper to taste

(4 servings)

Veal and ham pie is well known as a delicious and nutritious dish.

Serving veal pinwheel savouries with tomato sauce is a delicious way of using up cooked meat.

Roll the steaks and secure them with a toothpick. Dip them in the flour and brown in shallow fat. Add the cream, salt, and pepper, cover, and simmer slowly for 1 to 1½ hours. Thicken the sauce with flour and water and pour it over the steaks.

Veal and Olives

1½lb. of veal steak
4 tablespoons of butter
Salt and pepper
½ cup of wine
1 tablespoon of lemon juice
8 or 9 olives

(4 servings)

Cut the veal in very thin pieces. Sprinkle the pieces with salt and pepper. Fry quickly in the butter on both sides. Add the wine, lemon juice, and the olives cut into narrow strips. Heat this sauce and serve it over the meat. The veal should take about 5 minutes to cook.

Stuffed Breast of Veal

4lb. of boned breast of veal
Salt and pepper
½lb. of thinly sliced ham

Stuffing

2 cups of breadcrumbs
2 veal kidneys
¼ cup of minced onion
½ cup of diced celery
1 teaspoon of salt
Pepper
¼ teaspoon of paprika
1 egg

(8 to 9 servings)

Sprinkle the veal lightly with salt and pepper. Mix all the ingredients for the stuffing. Spread this on the veal and arrange the ham on the

stuffing. Roll up the roast and tie it with string. Melt 2 tablespoons of fat and brown the meat on all sides. Add ½ cup of water, cover, and simmer for 2½ to 3 hours. Serve either hot or cold.

Swedish Veal Fillets

1½lb. of veal fillets (cut in thin pieces)
Salt and pepper
2 tablespoons of butter
Stock or water
2 teaspoons of parsley (chopped)
2 teaspoons of lemon juice
½ pint of cream

(4 servings)

Sprinkle the meat with salt and pepper. Mix the butter, parsley, and lemon juice. Place a pat of the butter mixture on each fillet. Roll and tie the fillets with string. Melt a little butter and brown the meat on all sides in this. Add sufficient stock or water to cover the meat. Cover and simmer until tender (1 to 1½ hours). Remove the meat and strain the sauce. Add the cream and heat very gently, but do not boil. Pour the sauce over the meat.

Veal and Ham Pie

1lb. of veal
Flour (seasoned)
½lb. of ham (cooked and diced)
1 hard-boiled egg (sliced)
1 teaspoon of mixed herbs
1 teaspoon of chopped parsley
1 teaspoon of salt
8oz. of flaky pastry

(4 to 5 servings)

Cut the veal into cubes, roll it in the flour seasoned with the salt, and brown in fat. Add sufficient water to cover the meat and simmer until tender (1 to 1½ hours). Add the ham, egg, parsley, and herbs and cover the dish with pastry. Bake at 450 degrees for 30 to 45 minutes.

Veal and Ham Loaf

2½lb. of veal (shank, breast, or neck)
½lb. of ham (cooked)
1 tablespoon of chopped onion
1lb. of tomatoes (chopped)
1 cup of breadcrumbs
½ teaspoon of mixed herbs
1 teaspoon of salt

(7 to 8 servings)

Mince the veal and the ham and add all the remaining ingredients. Mix well and put into a greased loaf tin. Bake in a moderate oven (350 degrees F.) for 2 to 2½ hours.

Veal Pinwheel Savouries

2 cups of cooked veal (minced)
1 small onion (finely chopped)
⅔ cup of water
4 cups of flour
6 teaspoons of baking powder (level)
6 tablespoons of butter or fat
About 1½ cups of milk

Cook the onion in the water and then add the veal. Reheat and thicken if necessary. Make a scone mixture from the remaining ingredients. Roll out the dough thinly and spread the veal over the top. Roll up the dough like a cylinder and cut it into cross-wise pieces about 1in. thick. Place cut side down on a greased oven tray. Bake at 375 degrees F. for 30 to 40 minutes. Serve with tomato sauce or gravy.

Preserving Mushrooms

By ELEANOR COUSTON,
Field Officer in Rural Sociology, Department of Agriculture, Christchurch

THE mushroom season is short, but while it lasts mushrooms can be used in many ways in sauces, soups, and savoury dishes. Delicious though they are, when abundant supplies are available it is usually felt that they would be appreciated more if their availability was spread over a longer period. For out-of-season use they can be preserved by bottling or by drying.

Bottling

THE methods recommended for bottling mushrooms are the same as for other kinds of vegetables, that is, by processing them in a water bath or in a pressure cooker which can be regulated to 10lb. pressure. Pint jars will hold a lot of mushrooms and are large enough for the use of an average-sized family.

Remove coarse stems, clean, peel, and wash the mushrooms as for cooking. Cut the large ones. Fry in a little lard for 1 minute, then add a very little water, and cook until tender. Alternatively, blanch the mushrooms by placing them in a wire basket or a muslin bag and lower them into boiling water until they are wilted. The first method results in a less watery product.

Pack into clean jars, add ½ teaspoon of salt to each jar, and fill up with the cooking liquid to within ½in. of the top. If there is not enough liquid, add hot water to the required level. If self-sealing lids are used, put the inner lid in position and screw on the band as tightly as possible.

Place the jars on a rack in the water bath. Pour in very hot water until the jars are covered. Put on the lid. Bring to the boil and boil for 3 hours.

If a pressure cooker is used, place the rack in the bottom of the cooker and add water to the level of the rack. Put in the jars, fasten the lid of the cooker, and heat until the steam has been issuing freely for 5 minutes. Close the petcock and let the pressure rise. Process at 10lb. pressure for 35 minutes for pint jars and 60 minutes for quart jars. Allow to cool slowly. When cool open the petcock gradually and remove the jars.

Allow the jars to stand in the upright position for 24 hours, then remove the outer screw band. Test the seal.

Drying

Prepare the mushrooms as for bottling. Place them in a wire basket or a muslin bag and blanch in steam for 8 minutes. Spread the mushrooms on wire racks and place these on the slatted shelves in the oven. Not more than two tray loads should be done at one time. The temperature of the oven should not exceed 150 degrees F., and the oven door should be left ajar throughout the drying period. Turn the racks and change from top to bottom every ½ hour. The time required is 6 to 8 hours.

Store in small, airtight containers, in a cool, dark place.

Heading photograph by Green and Hahn.

Care of Lawns in the Flower Garden

WELL-KEPT lawns are the natural setting for the flower garden, providing a background for flowers and a pleasant area for outdoor activities. In this article J. P. Salinger, Horticulturist, Department of Agriculture, Wellington, describes the establishment and maintenance of a lawn. The section on garden work for March is by Elspeth Gray, Horticultural Instructor, Department of Agriculture, Auckland.

THE establishment and management of pasture and grass are well understood by the agricultural community, but the requirements for lawn grasses and for the development of good turf in the garden are different from those of good farming practice. The farmer requires constant production from strong-growing grasses and clovers, but the gardener should aim at a slow, steady growth of less-productive grasses without clover or other plants. A farmer applies lime and superphosphate to obtain maximum production, but the gardener should follow a different method by applying acidifying fertilisers to build up a "turf mat", discourage weeds and worms, and obtain an even, close sward.

Making a New Lawn

Often one of the first tasks of the owner of a new section is to make a lawn to give an air of maturity to the new home. As for all operations in the garden care and thorough preparation in the early stages will provide a more satisfactory result with easier maintenance.

It is seldom possible to make a first-class lawn from existing grass on a new section, as the turf consists of the wrong species of grasses and will probably be uneven and contain undesirable weeds. It is better to make use of the stored fertility of this grass by working it into the topsoil and preparing a lawn in the correct manner; the new lawn will be much more satisfactory eventually.

Time to Sow

Lawn grasses establish best in autumn from March to May, when the soil is still warm and autumn rains have moistened it completely. In areas where frosts occur early or where a new section is taken over in autumn or early winter seed should be sown in spring from August to October. Provided the basic preparation has been thorough and a very dry spell does not follow the seed sowing, a spring-sown lawn can be quite satisfactory.

A really good lawn can be obtained only by intensive soil preparation before sowing; once a lawn is established it is difficult to level off an uneven surface or eradicate undesirable grass species.

Initial Preparation

If a lawn is to be sown in autumn, the gardener usually prefers to crop the ground earlier in the season. For a spring-sown lawn no crop can be taken after the previous autumn. In both cases the soil should be left free of crops for a month before sowing to allow the ground to settle and to destroy germinating weeds by light cultivation.

The ground should first be dug over or cultivated with a rotary hoe several times and all perennial weeds and

HEADING PHOTOGRAPH: No flower garden is complete without a lawn, which blends the house with the garden and provides a foil for flower borders, trees, and shrubs. Photo News photograph.

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grass weeds like twitch (couch) forked out. The ground should then be roughly levelled.

Deep depressions or high places should be levelled by removing the topsoil, filling in or removing the subsoil, and then replacing the topsoil. A similar practice should be followed where a terrace is made. If subsoil is near the surface in one area and deeply covered with topsoil in another, the resultant grass growth will be uneven. Where consolidated subsoil is exposed it should be cultivated before any topsoil is added to it. On a sloping section provided it is not too steep, it is often better to make an even slope rather than to terrace, as the upper and lower sides of a terrace are difficult to grass down and mow satisfactorily.

It is not necessary either to add animal manure or compost or to import fresh topsoil to make a lawn; grass growth will be satisfactory even on subsoil if this is adequately manured with fertilisers.

Crops before Autumn Sowing

The main aim of cropping the area in summer before autumn sowing is to work the soil into a good texture and to destroy weeds which will develop from exposed seeds. As the initial rough levelling has been done, it is unwise to grow potatoes on this area, because the moulding and digging will disturb the evenness of the soil. Quick-maturing crops like peas, beans, and salad vegetables or summer annuals should be grown, so that the final preparation can take place in good time. If the area is left free of crops for about a month, germinating weeds can be killed by hoeing.

Final Preparations

Once the crops have been removed, or after winter rains for a spring sowing, the ground should be lightly forked over or cultivated with a rotary hoe to a depth of not more than 4in. The final working to obtain an even surface, whether on level or sloping ground, can then be carried out. Large stones or broken rock should be picked off and smaller stones raked off in two directions, so that the soil is evenly spread as the raking proceeds. A roller is not suitable for developing an even surface; it will merely show the mounds and depressions and break up lumps of soil. The most satisfactory tool for levelling is a levelling board consisting of a straight-edged board (about 4ft. x 6in. x 1in.) with chamfered edges and firmly fixed to a 6ft. long round handle. The soil should be raked and levelled with the levelling board several times and the whole area well consolidated by "heeling". In this process the gardener treads closely across the area, pressing his heels into the soil.

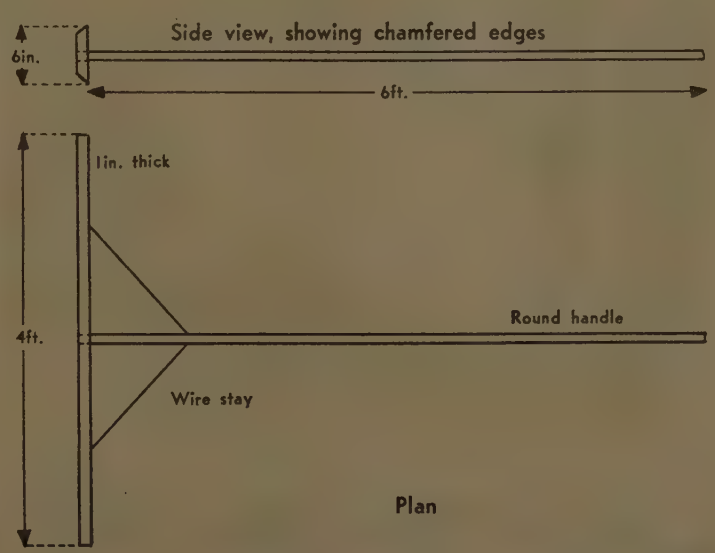
Though this initial preparatory work is tedious, it is also very necessary, for depressions of even an inch or small mounds of the same height can make a lawn very uneven.

[*Sparrow*

Lawn edges should be trimmed each time the lawn is mown; regular care and maintenance produce a hard-wearing, attractive lawn.

Finally the area should be left so that the soil is well consolidated and even, with a surface tilth of fine soil about ½in. deep. If this preparation is carefully carried out, it is not necessary to use pegs or levels to obtain an even surface.

Fertilisers should be applied during this final preparation, and on most soils a dressing of 2 parts of sulphate of ammonia and 1 part of superphosphate at 1oz. per square yard should be evenly spread over the surface; lime will not be necessary at this time, except where the soil is very acid, as the fine-leaved grasses grow best in a slightly acid soil. Where a flower bed is to be made adjacent to a lawn it is better to prepare the area for lawn well into the flower bed area so that the edge can be cut back subsequently. Where trees or shrubs are to be planted in a lawn the whole area



[*After E. A. Madden*

Diagram of levelling board.

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should be prepared for grass and the planting holes made after the grass has become established.

It is almost impossible to trim grass neatly when it is adjacent to a wall; it is advisable in such cases to make a small bed along the base of the wall or run a 2in. strip of concrete along the base so that the lawnmower and edging tools can be used.

Seeds Mixtures

The cost of grass seed is a small item compared with the amount of labour put into the preparation of a lawn. The most suitable grass for the district should be chosen and in most parts the fine-leaved grasses are best and produce the finest turf. The most satisfactory species generally are browntop and chewings fescue. The following mixture at ½oz. to 1oz. per square yard provides a really fine-leaved, even turf:—

	Parts
Certified browntop	1
Chewings fescue	2

Perennial ryegrass is an unsatisfactory lawn grass for any but the roughest areas, as it grows more strongly than other grasses early in the year and then produces flower stalks which are difficult to mow with hand mowers.

In sandy coastal areas, where a greener lawn is required in summer, the following mixture at ½oz. per square yard is suitable:—

	Parts
Chewings fescue	10
Certified browntop	2
Yarrow	1

For light soils in a hot climate such as Canterbury the following mixture at ½oz. to 1oz. per square yard is recommended:—

	Parts
Chewings fescue	4
Dryland browntop (if available	1
Browntop	1

In northern areas paspalum may be used alone. Owing to its low germinating capacity, the seed should be sown at 2oz. to 3oz. per square yard.

In these areas it is often better to have a paspalum-dominant turf; otherwise this plant can be an undesirable grass weed in a fine-leaved lawn. Paspalum should be sown in September or October.

Clover is seldom desirable in a good lawn, as it dries out in summer and can be slippery in winter. If present in quantity, it may be dangerous at flowering time owing to bees' working the flower heads.

Sowing the Seed

As most grass seed is small and must be sown evenly, it is advisable to divide the total quantity of seed into four parts and sow the seed at right angles and diagonally over the area. As seed sowing on any but a small area is quite difficult, it is advisable to practise first with some fine dry sand of about the same quantity as one part of the seed. The soil should be raked before sowing and raked again lightly afterward. It is not advisable to roll the surface, as except on very sandy soils the topsoil would form an undesirable crust.

Birds and cats can be troublesome on a newly sown area. They can be kept away by stretching black cotton on low pegs across and around the plot in various directions.

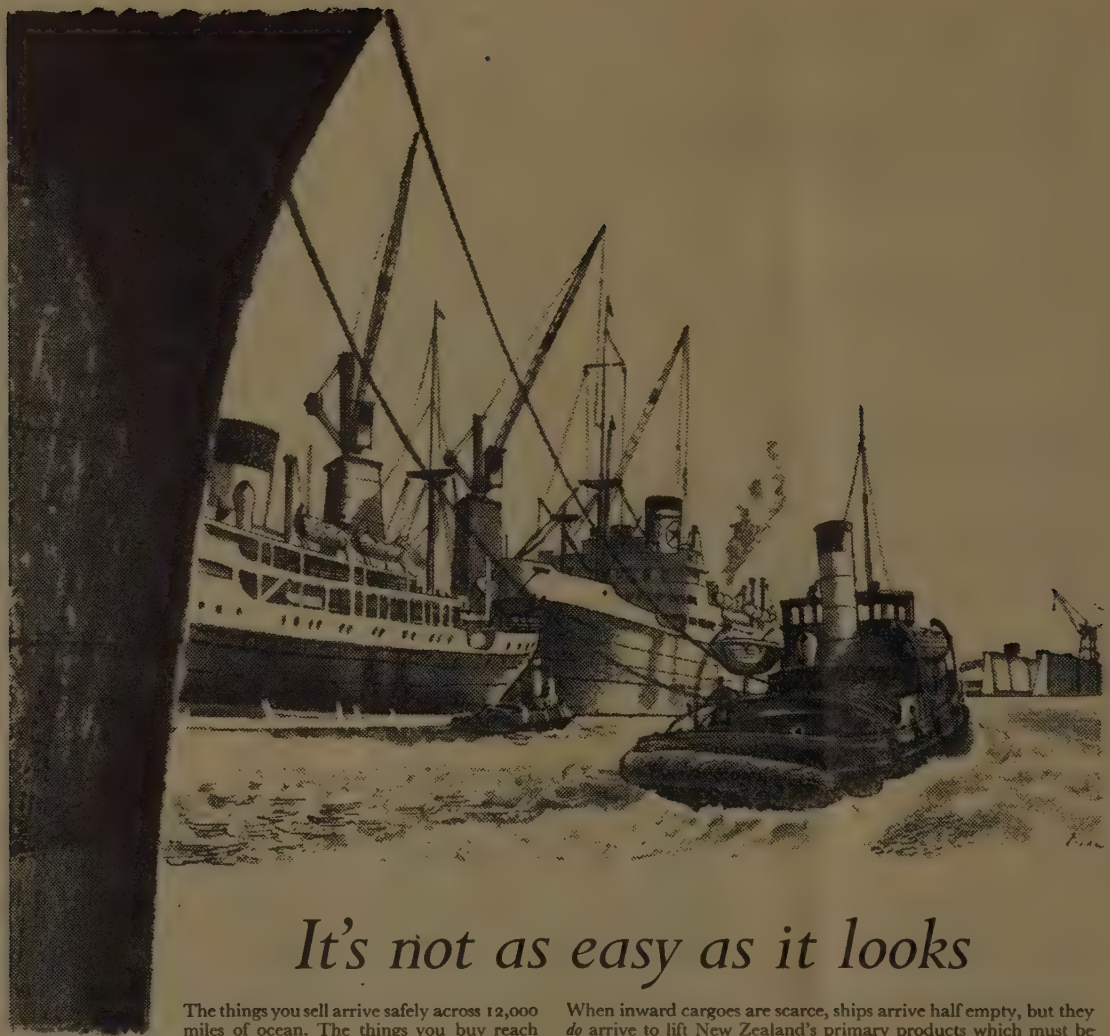
Care of Newly Sown Grass

Even if dry weather occurs after sowing, it is unnecessary to water the lawn, as the seed will germinate on a well-prepared seed-bed once sufficient rain falls. Artificial watering is likely to fall unevenly and wash the seed into channels.

When the seedlings are 1½in. to 2in. high and the soil dry the grass can be cut with a sharp lawnmower set high without a grass catcher. Rolling with a very light roller is beneficial, but a heavy roller should not be used. Subsequently the mower can be set lower and the catcher used.

If the young grass appears yellow at this stage, it can be given a dressing of sulphate of ammonia dissolved in water and applied at ½oz. per square yard. Seedling weeds may also appear, but these will disappear under close mowing and correct maintenance.

At left and below—Two methods of trimming the edges of a lawn. The wheeled cutter shown at left is especially useful when used against a firm surface. The stepping stones are set below the level of the grass so that a mower can pass over them without the blades being damaged. Sparrow photographs.



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Routine Management of Established Lawns

Good grass can be obtained and retained only by mowing, manuring, cultivation, and weed control.

Grass needs to be mown regularly, in some parts all through the year. The mower should be sharp and a grass catcher used except during very dry weather in summer. Lawn mowings are valuable in other parts of the garden. Edges should be trimmed each time the lawn is mown, and once the turf is well established it is seldom necessary to cut back the edge with an edging iron if the grass is regularly and closely trimmed.

Manuring

Research in New Zealand over many years has shown that the fine-leaved grasses flourish on an acid soil. A good turf has a definite mat of old, slowly decomposing grass beneath the surface and this mat develops under slightly acid conditions.

Dressings of the following mixture should be applied at 1oz. per square yard at least in autumn, early spring, and late spring:—

	Parts
Sulphate of ammonia	3
Superphosphate	1

If this mixture is applied **very evenly** in fine weather when the grass is damp with dew, it will also control flatweeds, but if it is applied **unevenly** in dry weather, the grass will be scorched and burnt in patches. Especially on small lawns where it is difficult to cast the fertiliser evenly it is better to apply the mixture in showery weather and use other methods to control weeds.

Liming will be required only after several years' use of the above mixture, when the grass appears unthrifty and a very thick mat has developed.

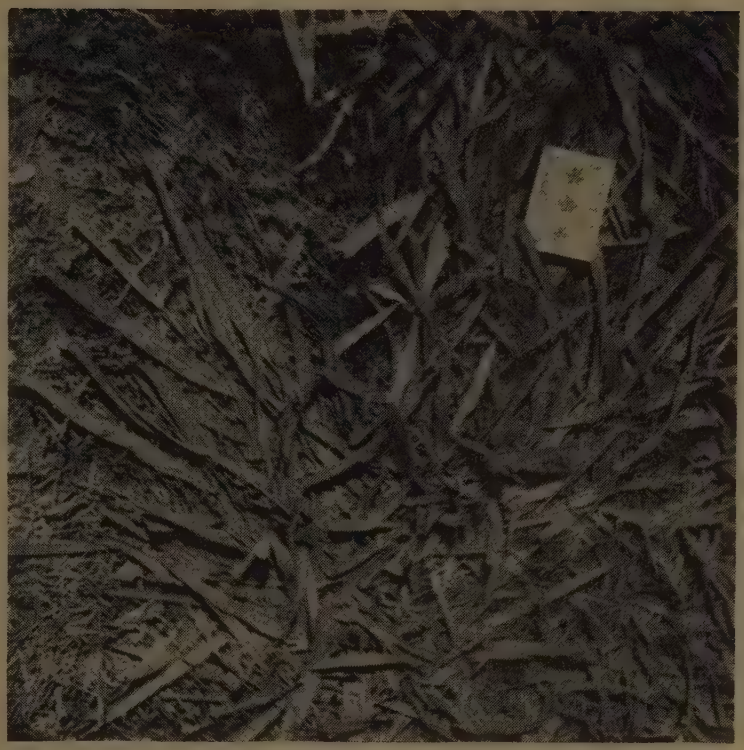
One dressing of garden lime at 6oz. per square yard should be applied in winter followed by the routine sulphate of ammonia-superphosphate mixture. It is not necessary, as recommended overseas, to dress a lawn with compost or organic manures.

Paspalum lawns will not require regular dressings of fertiliser once they are well established.

Cultivation

As well as regular mowing a good lawn is kept in condition by raking, spiking, and topdressing with soil.

Most grasses including browntop produce long shoots or tillers which tend to be coarse and give a brown appearance to the lawn. These tillers can be lifted by raking the lawn in autumn with a sharp-toothed rake. Additional weight can be given to the head of the rake by tying a bag of soil to the base of the handle and the head. Subsequent mowing will remove the tillers which have been lifted.



[*Photo Nevs*

Paspalum can be a troublesome grass weed in a fine turf owing to its coarse growth. By itself it provides a satisfactory turf in warm areas.

Spiking and coring are two necessary operations, especially in established grass with a thick turf mat. This turf mat prevents air and water from entering the soil, and coring with a special hollow-tined fork will overcome this. Intensive coring will also lower high spots, the areas which produce a brown, patchy appearance in dry weather. Spiking can be carried out by inserting a square-tined garden fork vertically at 6in. intervals and pulling it out without levering up the grass. Shallow depressions can be filled by spiking and brushing in fresh soil. Higher mounds or depressions should be treated by cutting off the turf, adding or removing the soil, and replacing the turf. Finally the whole area should be lightly covered with soil.

Topdressing with soil is another autumn operation which should follow coring and spiking. Care should be taken in selecting the topdressing soil. Except on very sandy areas fairly coarse, open topdressing soil should be chosen, as one containing too much silt or clay will seal over and form an undesirable crust. It should be used at 1 bushel to 7 sq. yds. and brushed into the grass.

Watering

Unless a really adequate supply of water is assured, it is better not to water a lawn in summer. Where there is plenty of water a really thorough watering should be given through a fine sprinkler and repeated every week. As at least 8 gallons of water per square yard will be required at each watering, it must be applied in fine droplets so that it slowly saturates the soil during several hours.

Weed Control

Weed control in lawns was fully described in the November issue of the "Journal", page 476. Lawn weeds can be divided into three classes, flatweeds, clovers, and grass weeds. Most flatweeds are controlled by routine applications of the sulphate of ammonia-superphosphate fertiliser mixture; plants which have been missed can be controlled by sprinkling a drop of dilute hormone weedkiller on to the leaves. If the fertiliser dressings have not controlled the flatweeds, MCP or 2,4-D preparations should be used.

Clovers can be controlled with 2,4,5-T preparations.

[*Photo News*
When Christmas lilies have to be moved this should be done as soon as the flower stalks die down after flowering. At this time the bulbs are resting and have no roots.

Combined flatweeds and clovers can be controlled with a mixture of 1 part of 2,4-D to 3 parts of 2,4,5-T applied at 1oz. acid equivalent to 76 sq. yds.

Grass weeds such as paspalum, cocksfoot, and Yorkshire fog can be controlled by spot application of TCA at 1oz. to 30 plants during wet weather.

In restricted areas it is unwise to spray weedkillers on to the lawn, as the spray drifts very easily on to adjacent plants. It is better to water the mixture on through a fine-rosed watering can, and if the correct amount of weedkiller per square yard is applied, it is not important if slightly more water is used than in spraying.

The gardener with only a small area of lawn can now buy proprietary preparations containing a mixture of sulphate of ammonia, a weedkiller, and an insecticide. This mixture is dissolved in water and applied to the lawn with a watering can; this operation feeds the grass, controls flatweeds, and provides some protection from soil insects. When the weeds have died and shrivelled up it is necessary to resow the patches with grass seed in damp weather.

Annual meadow grass (*Poa annua*) develops in open turf during winter, especially where lime has been used.

Moss

Contrary to general opinion moss does not develop because a lawn is damp or shady, and it cannot be controlled by liming. Moss develops because the grass is weak and undernourished, conditions which normally occur under trees or in moist places. The main aim should be to stimulate the grass once the moss has been eradicated.

A chemical which is widely used in the paint industry and to a less extent for weed control, sodium pentachlorphenate, has given excellent moss and algae control at 1oz. to 25 sq. yds. A proprietary form sold in 1oz. tablets under the name of "Santobrite" can be bought from most paint merchants. These tablets should be dissolved in hot water, and once this has cooled the solution can be diluted with sufficient cold water to cover 25 sq. yds. Larger quantities are sold as sodium pentachlorphenate. This should be applied in moist "growing weather" in spring or autumn, and once the moss is dead the fertiliser mixture should be applied to stimulate the grass. Rubber gloves and boots should be worn when pentachlorphenate is used, as it is a poisonous material when absorbed by the skin.

Pests

Worms, grass-grub, and subterranean grass caterpillar (porina) are the three main pests of lawns. Worms gradually disappear under the acidifying effect of the fertiliser mixture, but they can be removed more quickly by 4 per cent. derris (rotenone) compounds at ½oz. per square yard.

Grass-grub can be controlled by watering on to the lawn in early summer 1½oz. of 20 per cent. DDT wettable powder to 10 sq. yds.

Subterranean grass caterpillar is controlled with lindane preparations at ½oz. of 10 per cent. material per 30 sq. yds.

A new material, aldrin, should prove of value in controlling both grass-grub and subterranean grass caterpillar.

Renovating Neglected Lawns

If a neglected lawn is composed mainly of undesirable grass species and has an uneven surface, it is probably better to use a rotary hoe or dig over the whole area in midsummer. It should be well worked and established as a new lawn.

However, if there are plenty of good grasses and the lawn is weedy and only slightly uneven, it can be easily converted to a good turf by applications of weedkillers, relevelling by lifting turfs and adding or removing soil, and adequate manuring. The first mowing should be done with the blades set high and the grass gradually cut closer at 3 or 4 days' interval. Liming may be needed, but probably the grass is mainly lacking in nitrogen, and manuring with the fertiliser mixture, raking, and topdressing with soil will soon convert the area into a good lawn.

Lawns Other than Grass

Certain bowling greens in the South Island and some gardens in the warmer parts of the North Island have a turf composed of small-leaved, rosette-like plants. These types of lawns are of only limited use, as manuring and weed control are two major problems, apart from the difficulties of obtaining sufficient plugs of the selected plants in a pure stand.

Generally, under most conditions a correctly established lawn of browntop and chewings fescue which is well maintained will be the most satisfactory type for the home gardener.

Flower Garden in March

Though the weather in northern districts should still be warm during March, frosts may occur farther south toward the end of the month and all the work to be done before winter should be completed in those areas as soon as possible. Even in warmer districts the feeding of plants should have been stopped to give young growth time to harden before winter, except in special cases such as chrysanthemums. Liquid manure can be given to chrysanthemums until the buds are showing colour.

Bulbs for spring flowering, as described in last month's notes, should be planted as soon as possible to give them time to make good growth. In most cases the flowers are already formed when bulbs are planted, so they will bloom no matter what time they are put in, but the next season's flowers may suffer from late planting. Aphids and caterpillars can still be very troublesome in the warmer districts, but applications of lindane and DDT respectively should control them.

Lilies

The best time to replant or move lily bulbs is as soon as the stems die

down. They are never truly dormant for long and most varieties start re-rooting very quickly. At this time of the year lily roots are least active, but they must be replanted in the shortest possible time after they are lifted. If the bulbs are exposed to sun and wind and allowed to dry out, the results the following season will be very poor. The depth at which the bulbs were planted should be noted and they should be replanted at the same depth. Varieties which root from the stem as well as the bulb, such as *L. henryi, L. auratum,* and *L. regale,* should be planted about 8in. deep, but for varieties such as *L. candidum, L. martagon,* and *L. pardalinum,* which root from the bulb only, 3in. to 4in. deep is sufficient.

Cuttings

Shrub cuttings that were taken in January may have rooted, and March is a good month for planting them out. If they are still small, it is better to plant them in a special bed and allow them to grow on for another year. When they are put straight into the shrubbery or among larger plants there is a danger that they will be overshadowed and perhaps severely checked or even killed by larger, more vigorous plants. On the other hand if rooted cuttings are left close together for too long in frames or even outdoor rows, they will have insufficient root or air space to enable them to form good bushy specimens.

Carnation layers should also have formed roots by now and they can be removed from the parent plants and set out.

Many woody shrubs, especially evergreens and roses, can be propagated by hard-wood cuttings taken during autumn. The best material to use is shoots of the current season's growth that have hardened off and are no longer growing actively.

By taking the cuttings in autumn rather than winter they have a better chance of developing roots before the buds break into growth in spring. From 6in. to 8in. long is the optimum length for taking hard-wood cuttings. The lower leaves are stripped from evergreen material. The lower cut should be made just below a node or leaf bud and the upper one just above a bud.

Hard-wood cuttings may be inserted from half to three-quarters of their length either in sand until they have callused over or straight into a sandy, well-drained position. They should be well firmed in, as if air pockets form around the base, rooting will be delayed or the base of the cutting may rot.

Perennials

Lifting and dividing of perennials may be started in March in the colder districts, if the plants have finished flowering and have begun to die down. If the soil gets very wet during winter, it is better to divide perennials in autumn or to leave them until early spring just before they start into growth.

Where a perennial border has been planned and is to be planted this season the ground should be thoroughly prepared beforehand. The soil should be dug deeply and organic manure such as compost or well-rotted animal manure incorporated with the soil. A generous quantity will provide sufficient humus for 2 or 3 years, by which time many of the plants will need lifting and dividing again.

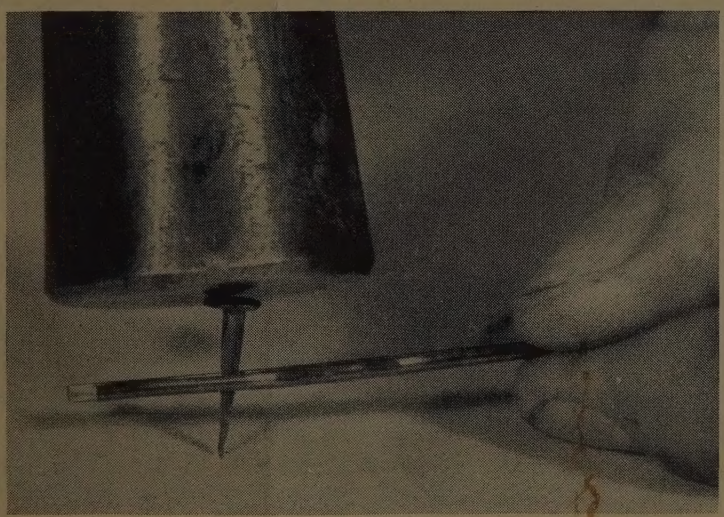
Subjects such as peonies which can remain in the same position for up to 10 years therefore need very good soil preparation, as once the plants are in, only surface cultivation can be carried out. In addition to the organic manure a dressing of 3 parts of blood and bone, 1 part of superphosphate, and 1 part of sulphate of potash (by weight) applied at up to 4oz. to the square yard each year when the plants are coming into growth will be beneficial.

Wrenching

Evergreen shrubs and trees such as camellias, citrus, and conifers never become fully dormant, and so are not transplanted during winter but are left until spring, when the roots are starting into active growth, and establish themselves more readily in the new position.

The shrubs will transplant even more readily if they are wrenched a few weeks before they are to be transplanted. The process consists of cutting the roots with a spade about 6in. to 9in. from the trunk. All roots should be severed, the spade being tilted a little so that the underneath roots are cut also. The trees are left in position until required for transplanting. Watering may be necessary if the soil is very dry or if drying winds occur later. With this treatment the shrubs should transplant without a check later on.

Safe Way of Hammering Tacks



HOUSEWIVES and others who have ever had difficulty in hammering in a small nail or tack may like to try this idea.

Insert the nail or tack between the prongs of a hair clip, hold the end of the clip, and hammer away—at a safe distance from the vulnerable fingers.

—EVELYN E. MOORE, formerly Field Officer in Rural Sociology, Department of Agriculture, Palmerston North

A Quickly Knitted Matinee Coat

THE first requirements of a baby's clothes are that they should be comfortable and attractive. The matinee coat illustrated is suitable in both these respects and can be quickly made if the instructions given here are followed.

ABBREVIATIONS: K, knit; st.(s), stitch (es); g.st., garter stitch; patt., pattern; tog., together; rep., repeat; wl. fd., wool forward; cont., continue; approx., approximately; beg., beginning; rem., remaining; m., make.

Materials: 2oz. of 3-ply baby wool; 2 No. 6 and 2 No. 9 knitting needles; ¾yd. of ribbon.

Measurements: Length, 10in.; sleeve seam, 3½in.

Tension: 7 sts. to 1in. on main part.

The Main Part

Using No. 6 needles, cast on 186 sts. Change to No. 9 needles and work in g.st. for 3 rows. Now work in patt.:—

1st row: K. 3 (k. 2 tog.) 3 times, * (wl. fd., k. 1) 6 times, (k. 2 tog.) 6 times. Rep. from * to last 15 sts., (wl. fd., k. 1) 6 times, then k. 2 tog. 3 times, k. 3.

2nd row: K. 3, p. to last 3 sts., k. 3.

3rd row: K.

4th row: K. 3, p. to last 4 sts., p. twice into next st., k. 3 (187).

5th row: K. 4, * k. 2 tog., rep. from * to last 3 sts., k. 3.

6th row: K. 3, then * putting the wool twice round the needle, k. 1, putting the wool twice round the needle, k. into the thread between the 2 sts. Rep. from * to the last 4 sts., then putting the wool twice round the needle, k. 1, then k. 3 in ordinary g. st.

7th row: K., dropping the loops made in the previous row on main part.

8th row: K. 3, p. to last 5 sts., p. next 2 sts. tog., k. 3 (186 sts.).

These 8 rows form the patt. Cont. in patt., keeping the border in g. st. until work measures approx. 7in. from beg., ending after a 1st patt. row.

Next row: Patt. 44, turn.

Next row: K. 2 tog., patt. to end.

Next row: Patt. to last 2 sts., p. 2 tog. (leave these 42 sts. on spare needle). Rejoin wool at needle point of rem. sts., cast off 8 sts. (1 st. left on needle from casting off), then patt. 82 sts., turn.

Next row: K. 2 tog., patt. to last 2 sts., k. 2 tog.

Next row: P. 2 tog., p. to last 2 sts., p. 2 tog., leave rem. 78 sts. on spare needle.

Rejoin wool at needle point of rem. sts., cast off 8 sts., and work this front to match other side.

The Sleeves

Using No. 6 needles, cast on 40 sts. Change to No. 9 needles and work in g. st. for 3 rows.

Next row: * K. twice into next st., k. 2. Rep. from * to last st., k. twice into last st. (54 sts.).

Change and work in patt., but omit the 3 sts. either end in g. st., thus 1st row will read:—

1st row: (K. 2 tog.) 3 times, * (wl. fd., k. 1) 6 times, (k. 2 tog.) 6 times. Rep. from * to last 12 sts., (wl. fd., k. 1) 6 times, then k. 2 tog. 3 times.

Cont. in patt. until work measures 3½in., ending after a 1st patt. row.

Next row: Cast off 4 sts. at beg. of row, patt. to last 2 sts., k. 2 tog.

Next row: Cast off 4 sts. at beg. of row, patt. to last 2 sts., k. 2 tog.

Next row: P. 2 tog., p. until 2 sts. rem., p. 2 tog. (42 sts.) Leave sts. on spare needle.

The Yoke

Assemble all sts. on to one needle, so that right side of work will be facing when working 1st row—sts. for left front, sts. for a sleeve, sts. for back, sts. for 2nd sleeve, sts. for right front. Join wool to right front edge and, using No. 9 needles, work thus:—

Next row: K. 3, (k. 1, k. 2 tog.) 8 times (k. 2, k. 2 tog.) 21 times, (k. 1, k. 2 tog.) 8 times, (k. 2, k. 2 tog.) 21 times, (k. 1, k. 2 tog.) 8 times, k. 3.

Next row: K. 3, k. 2 tog., then k. to end.

Change to yoke patt.:—

1st row: K. 4, * k. 2 tog., rep. from * to last 3 sts., k. 3.

2nd row: K. 3, then * putting the wool twice round the needle, k. 1, putting the wool twice round the needle, k. into the thread between the 2 sts. Rep. from * to last 4 sts., then putting the wool twice round the needle, k. 1, then k. 3 in ordinary g. st.

3rd row: K., dropping the loops made in the previous row on main part.

4th row: K. 3, p. 10, * p. 2 tog., p. 6.

Rep. from * to last 6 sts., p. 3, k. 3.
5th to 7th rows: As 1st to 3rd rows.
8th row: K. 3, p. 9, * p. 2 tog., p. 5.

Rep. from * to last 7 sts., p. 4, k. 3.
Work 3 rows in patt.
12th row: K. 3, p. 8, * p. 2 tog., p. 4.

Rep. from * to last 8 sts., p. 5, k. 3.
Work 3 rows in patt.
16th row: K. 3, p. 8, * p. 2 tog., p. 3.

Rep. from * to last 8 sts., p. 5, k. 3.
Work 3 rows in patt.
20th row: K. 3, p. 7, * p. 2 tog., p. 2.

Rep. from * to last 9 sts., p. 6, k. 3.
Work 2 rows in g. st.
Next row: K. 3, * m.l., k. 2 tog., k. 2.

Rep. from * to end.
Work 2 rows in g. st. and cast off.

To Make up

Press work lightly. Sew up sleeve seams. Thread ribbon through holes at neck edge and tie. Press seams.

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